



# GOES-R Series

## Ground Segment (GS) Project

### Functional and Performance

### Specification (F&PS)

Version 1.10

May 8, 2009



U.S. Department of Commerce (DOC)  
National Oceanic and Atmospheric Administration (NOAA)  
National Environmental Satellite, Data, and Information Service (NESDIS)

## **GOES-R Series Ground Segment Project Functional and Performance Specification**

Prepared by:

Original Signed 5/15/08

---

John Bristow Date  
GOES-R Ground Segment  
Systems Engineering Deputy Lead

Original Signed 5/15/08

---

Richard Ullman Date  
GOES-R Ground Segment  
Systems Engineering Deputy Lead

Approved by:

Original Signed 5/15/08

---

Barbara Pfarr Date  
GOES-R Ground Segment  
Systems Engineering Lead (Acting)

Original Signed 5/15/08

---

Robin Pfister Date  
GOES-R Ground Segment  
Deputy Project Manager

Original Signed 5/15/08

---

Vanessa Griffin Date  
GOES-R Ground Segment  
Project Manager

## CHANGE RECORD

<b>DOCUMENT TITLE: GOES-R Series Ground Segment Project Functional and Performance Specification</b>			
<b>VERSION</b>	<b>DATE</b>	<b>PAGES AFFECTED</b>	<b>DESCRIPTION</b>
1.0	13 May 08	All	Final
1.1	20 May 08	Appendices A&D	Revision (CCR-01245)
1.2	10 Jul 08	Appendix A, Table 2	Revision (CCR-01263)
1.3	27 Aug 08	Appendices A-D	Revision (CCR-01276)
1.4	23 Sep 08	pp.19, 23, 42, 50, 53, 66	Revision (CCR-01282, CCR-01285, CCR-01286, CCR-01288)
1.5	29 Oct 08	pp. 13, 14, 16, 66, 67, 81, 110	Revision (CCR-01292, CCR-01305, CCR-01313)
1.6	21 Nov 08	pp. 8, 10, 13, 57, 61, 62, 66, 67, 75, 93, 105	Revision (CCR-01290, CCR-01326, CCR-01328, CCR-01329, CCR-01330)
1.7	15 Dec 08	pp. 12, 13, 14, 41, 63, 67, 70, 71, 73, 79, 80, 101, 102, 104, 108, 109, 113	Revision (CCR-01291, CCR-01304, CCR-01333, CCR-01334, CCR-01341, CCR-01352)
1.8	29 Jan 09	pp. 9, 68, 81, 110	Revision (CCR-01365, CCR-01366, CCR-01368)
1.9	25 Mar 09	pp. 11, 13, 39, 41, 56, 59, 60, 62, 63, 64	Revision (CCR-01392, CCR-01393, CCR-01394, CCR-01395, CCR-01396, CCR-01399, CCR-01409, CCR-01410, CCR-01414, CCR-01416, CCR-01428, CCR-01429, CCR-01430)
1.10	8 May 09	pp. 4,5,6,9,13,14, 39,40,42	Revision (CCR-01455, CCR-01457)

The document version number identifies whether the document is a working copy, final, revision, or update, defined as follows:

- **Working copy or Draft:** a document not yet finalized or ready for distribution; sometimes called a draft. Use 0.1A, 0.1B, etc. for unpublished documents.
- **Final:** the first definitive edition of the document. The final is always identified as Version 1.0.
- **Revision:** an edition with minor changes from the previous edition, defined as changes affecting fewer than one-third of the pages in the document. The version numbers for revisions 1.1 through 1.9, 2.1 through 2.9, and so forth. After nine revisions, any other changes to the document are considered an update. A revision in draft, i.e. before being re-baselined, should be numbered as 1.1A, 1.1B, etc.
- **Update:** an edition with major changes from the previous edition, defined as changes affecting more than one-third of the pages in the document. The version number for an update is always a whole number (Version 2.0, 3.0, 4.0, and so forth).

## TABLE OF CONTENTS

<b>LIST OF FIGURES.....</b>	<b>VII</b>
<b>LIST OF TABLES.....</b>	<b>VIII</b>
<b>TBX LIST.....</b>	<b>0</b>
<b>1 INTRODUCTION.....</b>	<b>1</b>
1.1 BACKGROUND .....	1
1.2 SCOPE .....	1
1.3 GOES-R MISSION OBJECTIVES .....	1
1.4 SPECIFICATION DERIVATION .....	1
1.5 TRACEABILITY .....	1
<b>2 DOCUMENTATION.....</b>	<b>2</b>
2.1 ORDER OF PRECEDENCE .....	2
2.2 DECLARATION OF REQUIREMENTS.....	2
<b>3 GOES-R GROUND SEGMENT DESCRIPTION .....</b>	<b>4</b>
3.1 GOES-R GROUND SEGMENT OVERVIEW .....	4
3.2 GOES-R GROUND SEGMENT REQUIREMENTS FUNCTIONAL DECOMPOSITION .....	5
3.3 GOES-R GROUND SEGMENT ROLE .....	5
3.4 GOES-R GROUND SEGMENT EXTERNAL INTERFACES .....	5
3.5 GOVERNMENT-FURNISHED PROPERTY .....	6
3.5.1 Facilities .....	6
3.5.2 Antennas .....	6
3.5.3 Communications .....	6
3.5.4 Product Distribution .....	6
3.5.5 Scientific Algorithms .....	7
<b>4 GROUND SEGMENT WIDE REQUIREMENTS .....</b>	<b>8</b>
4.1 OVERVIEW .....	8
4.2 PHYSICAL DEPLOYMENT AND REMOTE OPERABILITY .....	8
4.2.1 Primary Facilities.....	8
4.2.2 Remote Backup Facility.....	8
4.3 GROUND SEGMENT MAINTAINABILITY .....	9
4.4 GROUND SEGMENT AVAILABILITY .....	10
4.5 LATENCY AND REFRESH .....	12
4.6 VERIFICATION AND VALIDATION .....	13
4.7 SEGMENT-WIDE REQUIREMENTS.....	13
4.7.1 Security.....	13
4.7.2 Telecommunications .....	14
4.7.3 Accessibility.....	14
4.7.4 Electromagnetic Interference.....	15
4.7.5 Operational Integrity.....	15
4.7.6 Time References.....	15
4.7.7 Data Processing Error Rate .....	15
4.7.8 Extensibility, Modularity, and Scalability.....	15
4.7.9 Configuration Management System.....	16
4.8 DEVELOPMENT ENVIRONMENT .....	17
4.8.1 Calibration/Validation / WCDAS Product Maintenance .....	18
4.8.2 Level 2+ Algorithm Maintenance .....	19
4.9 INTEGRATION AND TEST ENVIRONMENT.....	20
4.10 OPERATOR HUMAN-MACHINE INTERFACE .....	21

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

<b>5</b>	<b>ENTERPRISE MANAGEMENT REQUIREMENTS .....</b>	<b>22</b>
5.1	OVERVIEW .....	22
5.2	GENERAL ENTERPRISE MANAGEMENT.....	22
5.2.1	<i>Enterprise Management Data Management .....</i>	<i>23</i>
5.2.2	<i>Enterprise Management Performance.....</i>	<i>23</i>
5.3	ENTERPRISE SUPERVISION .....	23
5.4	COMMON SUPPORT SERVICES .....	25
5.5	GROUND SEGMENT INFRASTRUCTURE .....	25
5.5.1	<i>External Interface Supervision .....</i>	<i>25</i>
5.5.2	<i>Ground Segment Security Monitoring .....</i>	<i>26</i>
<b>6</b>	<b>MISSION MANAGEMENT REQUIREMENTS.....</b>	<b>26</b>
6.1	OVERVIEW .....	26
6.2	OPERATIONAL VIEW .....	26
6.3	GENERAL MISSION MANAGEMENT .....	26
6.4	SATELLITE ENGINEERING TELEMETRY MONITORING .....	28
6.5	EVENT LOGS .....	28
6.6	REMOTE ACCESS TO MISSION MANAGEMENT DATA .....	29
6.7	ANOMALY RESPONSE .....	29
6.8	GROUND DIRECTIVES .....	30
6.9	ENGINEERING TELEMETRY .....	30
6.10	ENGINEERING ANALYSIS .....	31
6.11	FLIGHT SOFTWARE MAINTENANCE.....	31
6.12	SATELLITE SIMULATOR INTERFACE .....	31
6.13	IMAGE NAVIGATION AND REGISTRATION .....	32
6.13.1	<i>Image Navigation and Registration Monitoring and Performance .....</i>	<i>32</i>
6.14	GRB PRODUCT MONITORING .....	33
6.15	COMMAND OPERATIONS.....	33
6.15.1	<i>Command Verification.....</i>	<i>35</i>
6.15.2	<i>Ground Command Management.....</i>	<i>36</i>
6.16	TELEMETRY .....	36
6.16.1	<i>Pseudo Telemetry.....</i>	<i>37</i>
6.16.2	<i>Satellite State Monitoring.....</i>	<i>37</i>
6.17	MISSION PLANNING AND SCHEDULING .....	38
6.18	SPACE-GROUND FUNCTIONAL COMMUNICATIONS .....	39
6.19	LAUNCH SEGMENT INTERFACE .....	40
6.20	SPACE SEGMENT INTERFACE .....	40
6.20.1	<i>Emergency Managers Weather Information Network / Low Rate Information Transmission Interface</i>	<i>40</i>
6.20.2	<i>Data Collection System Interface .....</i>	<i>40</i>
6.21	ANTENNA.....	41
6.22	UPLINK SERVICES .....	41
6.22.1	<i>Uplink Radio Frequency Monitoring.....</i>	<i>42</i>
6.22.2	<i>Downlink Radio Frequency Monitoring .....</i>	<i>42</i>
6.23	TELEMETRY DOWNLINK RECEIVE.....	42
6.23.1	<i>Telemetry Monitoring .....</i>	<i>43</i>
6.24	RAW INSTRUMENT DATA PRE-PROCESSING .....	43
6.24.1	<i>Ranging Services .....</i>	<i>44</i>
6.24.2	<i>Space-Ground Communications Performance .....</i>	<i>44</i>
6.25	SPACECRAFT NAVIGATION .....	44
6.26	ORBIT DETERMINATION.....	45
6.27	LEVEL 0 PROCESSING.....	45
6.28	MISSION MANAGEMENT STORAGE .....	46
6.28.1	<i>Raw Data Recorder .....</i>	<i>46</i>
6.29	CALIBRATION SCHEDULING .....	48

<b>7</b>	<b>PRODUCT GENERATION REQUIREMENTS .....</b>	<b>48</b>
7.1	OVERVIEW .....	48
7.2	OPERATIONAL VIEW .....	49
7.3	PRODUCT GENERATION .....	49
7.4	METADATA GENERATION .....	53
7.5	PRODUCT GENERATION SUPERVISION.....	54
7.6	GENERATE LEVEL 1 PRODUCTS .....	55
7.7	INSTRUMENT RADIOMETRIC (INCLUDING PHOTOMETRIC) AND ENERGETIC PARTICLE CALIBRATION.....	56
7.8	GENERATE LEVEL 2+ PRODUCTS .....	57
7.9	PRODUCT GENERATION STORAGE.....	57
7.10	GOES REBROADCAST SIMULATOR.....	57
7.11	OPERATIONAL INSTRUMENT CALIBRATION DATA METRICS MONITORING .....	59
<b>8</b>	<b>PRODUCT DISTRIBUTION REQUIREMENTS.....</b>	<b>59</b>
8.1	OVERVIEW .....	59
8.2	PRODUCT AND DATA DISSEMINATION .....	60
8.3	AUTHORIZED USER SERVICES .....	61
8.4	DATA PRODUCT DELIVERY .....	64
8.5	PRODUCT DISTRIBUTION STORAGE.....	64
	<b>APPENDIX A: END PRODUCT PERFORMANCE PARAMETER TABLES.....</b>	<b>66</b>
	<b>APPENDIX B: OSD-ALLOCATED GROUND LATENCY FOR GOES-R ACCESS SUBSYSTEM .....</b>	<b>92</b>
	<b>APPENDIX C: OSD ALLOCATED GROUND LATENCY FOR ANTENNAS.....</b>	<b>96</b>
	<b>APPENDIX D: IMPROVED LATENCIES AND REFRESH RATES FOR PRODUCT SETS 1 AND 2 (OPTION 1).....</b>	<b>100</b>
	<b>APPENDIX E: AWIPS SECTORIZED PRODUCT SET CHARACTERISTICS.....</b>	<b>111</b>

## LIST OF FIGURES

FIGURE 1: GOES-R SYSTEM OVERVIEW .....	3
FIGURE 2: ALLOCATION OF MISSION PRODUCT LATENCY .....	68

## LIST OF TABLES

APPENDIX A TABLE 1: BASELINE END-PRODUCT SETS AND PERFORMANCE PARAMETERS .....	69
APPENDIX A TABLE 2: PRODUCT QUALIFIERS .....	82
APPENDIX A TABLE 3: OPTION 2 END-PRODUCT SETS AND PERFORMANCE PARAMETERS .....	86



## TBX LIST

DOORS ID/ Page	Section	Summary	OPR
p. 4	3.1	The third site is a geographically diverse remote backup facility (RBU), located at Fairmont, WV (TBR).	
GSFPS-2719	4.2	The GOES-R GS functionality will be installed and operated at three sites. The NOAA Satellite Operations Facility (NSOF) in Suitland, MD and the Wallops Command and Data Acquisition Station (WCDAS) at Wallops, VA, are facilities that host current GOES systems. Together they will serve as the GOES-R primary facilities for operations. The third site will be a geographically-diverse Remote Backup Facility (RBU), located at Fairmont, WV (TBR), which will host a subset of the GS functionality and enable continuity of operations.	
GSFPS-1174	4.2.2	The GS RBU functionality <b>shall</b> be deployed at Fairmont, WV (TBR).	
GSFPS-2344	8.2	The GS <b>shall</b> acknowledge receipt of data requests within ten seconds (10 seconds) (TBR).	
GSFPS-2382	8.3	The GS <b>shall</b> accommodate concurrent transfers of product files to 100 (TBR) ad hoc users through the GOES-R Access Point.	
GSFPS-2916	8.3	The GS <b>shall</b> begin transfer of any requested and available product from the GOES-R Access Point to the requester within five (5) seconds (TBR) of ad hoc request validation.	
GSFPS-2428	8.4	The GS <b>shall</b> process a minimum of 200 (TBR) simultaneous subscription service data transfers.	
GSFPS-3137	8.4	The GS <b>shall</b> be capable of transferring data from the GOES-R Access Point to users at a minimum combined rate of 500 Mbps (TBR).	
GSFPS-3153	8.4	The GS <b>shall</b> transfer data from the GOES-R Access Point to users at a minimum combined rate of 500 Mbps (TBR).	

# 1 INTRODUCTION

## 1.1 Background

The next generation Geostationary Operational Environmental Satellites (GOES), designated the GOES-R Series, are required to provide continuity and improvement of remotely-sensed environmental data from a geosynchronous orbit in the 2014-2028 era. The GOES-R Program, which has the responsibility to acquire and implement the GOES-R mission, is being implemented through the GOES-R Ground Segment Project (GSP) and the GOES-R Flight Project. The GSP will acquire the integrated, distributed GS that will conduct satellite operations and instrument product generation and distribution. Details about the GOES-R conceptual architecture, functionality, and operations are documented in the reference GOES-R Program Concept of Operations (P417-R-CONOPS-0008).

## 1.2 Scope

This document, together with all GOES-R GS Interface Requirements Documents (IRDs) (see Ground Segment Applicable and Reference Documents List (G 417-R-LIST-0165)) and the Ground Segment Mission Assurance Requirements document (G 417-R-GSMAR-0068), specify the functional and performance requirements with which the GS **shall** comply.

Sections 4 through 8 of this specification contain the high level functional and performance requirements for the GS portion of the GOES-R Series System. The column headings of these sections indicate the GSP DOORS ID Number, the contract option number, and the developing organization responsible for each requirement, and the requirements.

The requirements in Sections 4 through 8 of this document are allocated to developing organizations that are providing the functionality described by each requirement.

The development effort column next to each requirement denotes antennas (ANT), GOES-R Access Subsystem (GAS), OSO, the Algorithm Working Group (AWG), the GS Contractor (GS Ktr), or ALL to allocate the requirement to one of the major development efforts. OSO and AWG requirements are explicitly identified; all organizations (ALL) indicates that the requirement applies to GS Ktr, ANT, and GAS. (CCR01430)

The Option column next to each requirement denotes Base, 0001, or 0002 to allocate the requirement to the baseline contract, or to one of the 2 options.

## 1.3 GOES-R Mission Objectives

- a) To maintain GOES mission continuity and quality in environmental observations in the 2014-2028 timeframe
- b) To provide enhanced environmental data products
- c) To improve services and data being provided to Users
- d) To be responsive to technology infusion to meet evolving User needs

## 1.4 Specification Derivation

The GOES-R Series Level I Requirements Document (LIRD) (P 417-R-LIRD-0137) levies NESDIS requirements on the GOES-R Program. The Mission Requirements Document (MRD) (P417-R-MRD-0070) captures the program - level system requirements and allocates a subset of those to the Ground Segment Project. The Ground Segment Functional and Performance Specification (GS-F&PS) (417-R-FPS-0089), and other requirements documents (e.g., IRDs) define derived GS level requirements. Parallel documents, the GOES-R Spacecraft Functional and Performance Specification (S-F&PS) (P 417-R-PSPEC-0014), and its associated IRDs exist for the Space Segment.

## 1.5 Traceability

This document is configuration controlled within the GOES-R GSP DOORS database. Requirements traceability is maintained within that database.

## 2 DOCUMENTATION

### 2.1 Order of Precedence

Any inconsistency in this solicitation or contract **shall** be resolved in accordance with Contract Clause 52.215-8 Order of Precedence.

Any inconsistency in other documents, exhibits, and attachments **shall** be resolved by giving precedence in the following order:

- a) The Statement of Work
- b) The Functional and Performance Specification
- c) The Interface Requirements Documents
- d) Other exhibits and attachments included in Section J
- e) The Applicable Documents
- f) The Reference Documents

Terminology applicable to this GS-F&PS is documented in the GOES-R Series Acronym and Glossary Document (P417-R-LIST-0142). In the event of conflict between terminology in this handbook and any other dictionary, the GOES-R terminology **shall** take precedence.

The full lists of applicable and reference documents, with associated document number and date of issue for each, are maintained in the Ground Segment Applicable and Reference Documents List (G 417-R-LIST-0165).

Applicable documents are Government prepared and controlled documents and industry standards documents.

Reference documents amplify or clarify the information presented in this document.

In the event of any unresolved conflict, the Contractor **shall** request conflict resolution by the Contracting Officer.

### 2.2 Declaration of Requirements

The following requirements terminology is used throughout this document:

- a) The term "**shall**" **shall** be interpreted to mean that the function, service, or capacity described is a mandatory requirement for the GS.
- b) The terms "**shall** provide the capability," "**shall** have the capability," "**shall** be capable," "**shall** enable," "**shall** permit" and "**shall** allow," **shall** be interpreted to mean that the function, service or capacity described is a mandatory requirement for the GS, but that the capability, service or capacity may not necessarily be exercised continuously (e.g., event driven, operator selected, operator initiated).
- c) The term "*should*" designates a desired level of performance the Government would like to achieve.
- d) All other declarative statements, including use of the term "*will*", only designate statements of fact or intentions of the Government and are not to be interpreted as contractor requirements.
- e) The term "*(TBS)*" means, "to be supplied", identifies missing or incomplete information, values, or data needed to fulfill a requirement.
- f) The term "*(TBD)*" means "to be determined", identifies a missing requirement.
- g) The term "*(TBR)*", means "to be refined/reviewed", means that the requirement is subject to review for appropriateness and subject to revision.

Effective Date: Date of Last Signature  
Responsible Organization: GOES-R/Code 417

G417-R-FPS-0089  
Version 1.10

- h) Requirements that contain the word "satellite" (singular) should be interpreted to apply for all GOES-R series satellites operated in the multi-satellite environment, unless stated otherwise, consistent with GS overall requirement for concurrent multiple satellite operations.

Refer to the Statement of Work for Government and contractor responsibilities associated with TBSs, TBDs, and TBRs.

### 3 GOES-R GROUND SEGMENT DESCRIPTION

#### 3.1 GOES-R Ground Segment Overview

Section 3 describes the GOES-R GS in terms of the high-level physical architecture, notional functional architecture, and external interfaces.

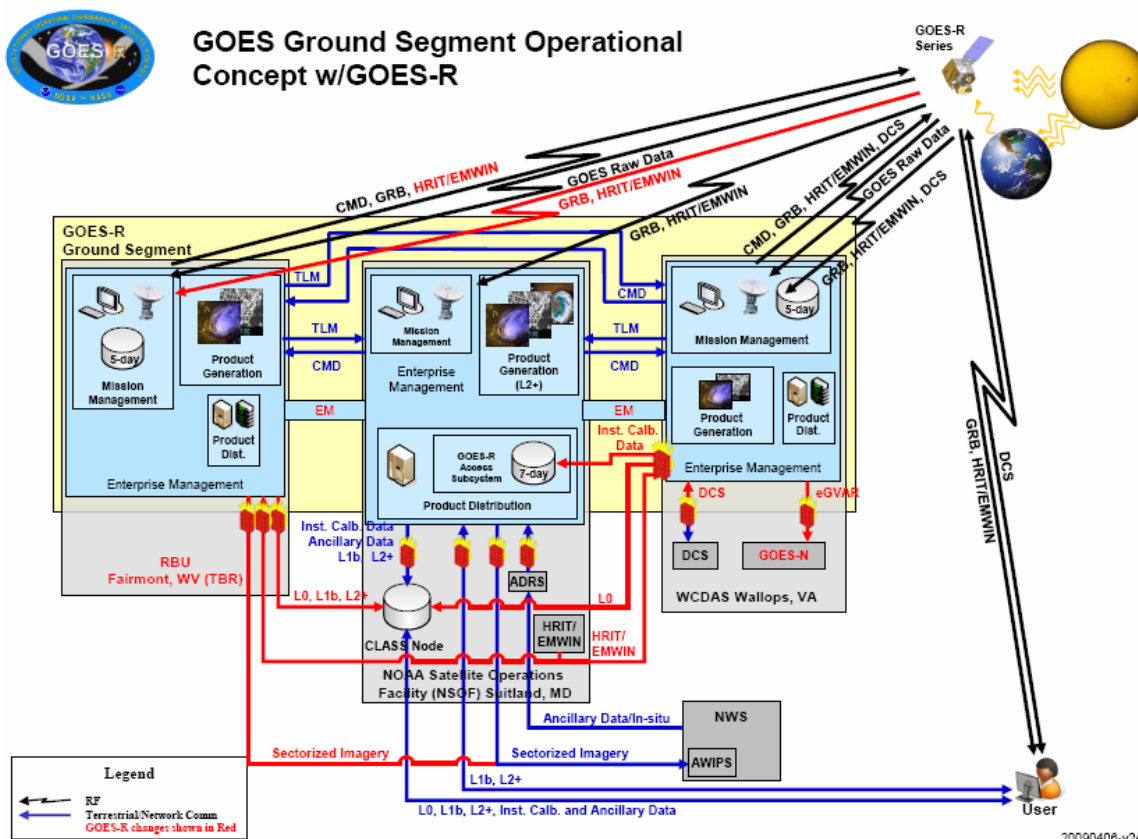


Figure 1: GOES-R Ground Segment Overview (CCR01457)

The GOES-R Ground Segment will operate from three sites. The NOAA Satellite Operations Facility (NSOF) in Suitland, MD will house the primary Mission Management (MM), and selected Product Generation (PG), and Product Distribution (PD) functions. The Wallops Command and Data Acquisition Station (WCDAS), located in Wallops, VA, will provide the primary space communications services, EM and MM functions, and selected PG and PD functions. The third site is a geographically diverse remote backup facility (RBU), located at Fairmont, WV (TBR). It will function as a completely independent backup for the MM and selected PG and PD functions for the production of Key Performance Parameters (KPPs) and GOES Rebroadcast (GRB) data, and will be capable of concurrent and remote operations from the NSOF and the WCDAS. The RBU will have visibility to all operational and on-orbit spare satellites. The KPPs consist of: cloud and moisture imagery: CONUS, Full Disk, and Mesoscale, and sectorized products. The Enterprise Management (EM) function is integrated across all ground segment components and locations.

The Ground Segment will include separate development and integration and test (I&T) environments for the purposes of ongoing development, improvement, and integration throughout the GOES-R mission. Portions of these environments will be located at both NSOF and WCDAS to support local site development, integration, and test activities.

The satellites will be commanded throughout their mission lifetime from the NOAA Satellite Operational Control Center (SOCC) located at NSOF with the ground station radio frequency (RF) interface located at the WCDAS, or the RBU. The engineering telemetry streams are received by the WCDAS and ground relayed to the SOCC for processing and monitoring. The raw sensor data is received by the WCDAS, processed, reformatted, and rebroadcast through the GRB transponder.

The raw sensor data are received by the WCDAS, processed by the PG function at the WCDAS to create L1b and some L2+ products, and rebroadcast through the GRB transponder. The GRB data are then received at the NSOF where the PG function will create the rest of the L2+ products. The L1b and L2+ products are then either sent directly or made available to users. At the RBU the raw sensor data will be received through its RF interface and processed by the PG function at the RBU. The RBU will be limited to the production of data to support distribution via GRB and the production of KPPs.

The GOES-R Series system will provide the following unique payload services (UPS):

- a) HRIT/EMWIN: EMWIN is a service that includes watches, warnings, forecasts, graphics, and other hydro-meteorological products provided by the National Weather Service (NWS). The High Rate Information Transmission (HRIT) data stream is comprised of satellite imagery, DCS products, derived products from GOES and Polar programs, and weather analysis and forecast maps from the NWS. OSD creates and merges the data streams (one for each of GOES East and GOES West) and provides to the GOES-R GS as an Intermediate Frequency (IF) signal for uplink. (CCR01457)
- b) DCS: The GOES DCS is a relay system used to collect information from earth-based platforms. These platforms transmit an electronic signal, containing the environmental data observed by the sensors on the platform, at predefined wavelengths and times. The transponder on board the GOES-R satellite will detect this signal, and then continuously rebroadcasts it so that it can be picked up by the ground equipment only located at the WCDAS.
- c) SARSat: The GOES SRSat transponder will receive emergency beacon transmissions for relay to ground stations responsible for search efforts.

The GOES-R series will support the transmission of GOES-R data in the emulated GVAR (eGVAR) format to facilitate the GOES user transition from GOES-N to GOES-R. eGVAR contains GOES-R data products packaged in the legacy GOES-N GVAR format and is transmitted to the GOES-N Ground System for broadcast.

The GOES-R GS will directly provide GOES-R data to the Advanced Weather Interactive Processing System (AWIPS). AWIPS is a computer workstation and communication network that serves as the nerve center of operations of all NWS Weather Forecast Offices (WFO) and NWS River Forecast Centers (RFC). Currently, the GOES-N system does not have its own interface to AWIPS. Instead, the Environmental Satellite Processing Center (ESPC) provides GOES data to the AWIPS. Unlike the GOES-N Ground System, the GOES-R GS will have the capabilities to interface with AWIPS.

GOES-R will employ CLASS services to provide archive services for GOES-R data. CLASS provides the archive and access services for the collection, archiving and dissemination of environmental data collected by a variety of in situ and remote sensing observing systems.

### ***3.2 GOES-R Ground Segment Requirements Functional Decomposition***

The GOES-R GS requirements fall into four primary functional categories: MM, PG, PD and EM. These categories have been defined as a basis for grouping functional attributes of the GS, and are not intended to imply an implementation of the GS. Necessary interface and support functions are included within the GS. The GS encompasses more than hardware and software systems, it includes the processes, services and personnel required to accomplish a set of functional tasks.

### ***3.3 GOES-R Ground Segment Role***

The details and descriptions of each of the elements of the GOES-R GS (MM, PG, PD, and EM) are provided in the GOES-R GS Concept of Operations.

### ***3.4 GOES-R Ground Segment External Interfaces***

The GOES-R Ground Segment is expected to interface to the following entities:



- a) GOES-R Space Segment
- b) GOES-R Launch Segment
- c) Unique Payload Services (HRIT/EMWIN, DCS) (*CCR01457*)
- d) Ancillary Data Relay System (ADRS) (OSD)
- e) Office of Satellite Development (OSD) Comprehensive Large Array-data Stewardship System (CLASS) (OSD)
- f) Advanced Weather Interactive Processing System (AWIPS) (NWS)
- g) GOES-N/O/P Ground System for eGVAR

### ***3.5 Government-Furnished Property***

The Government will provide resources as defined in the GOES-R Government Furnished Property List.

#### ***3.5.1 Facilities***

The GS facilities, including power, environmental controls, and floor space, will be provided by the Government.

#### ***3.5.2 Antennas***

The GS antenna subsystem(s), including the RF equipment to the IF switch, will be provided as GFP to the GS Contractor. OSD will procure, install, and accept this equipment for the Government. Once OSD has accepted this equipment it will be turned over to the GS Contractor to integrate into the GOES-R GS.

#### ***3.5.3 Communications***

Communications required for the GOES-R GS will be purchased/leased by OSO. The interface to the communications circuits at a distribution frame will be located at the communications service provider's demarcation point. Interface descriptions, circuit types, and supported data rates for connections to the circuits terminated at the distribution frame will be provided by the GS contractor to the Government. All CSU/DSUs, multiplexers, modems, and other related communications equipment on the service provider side of the demarcation point will be provided by OSO.

#### ***3.5.4 Product Distribution***

The GFP portion of the PD function provides distribution of L0, L1b, L2+, and associated mission data produced by PG. The PD function will:

- a) Send data and products from PG to the GOES-R Access Subsystem
- b) Make available data and products through the GOES-R Access Point for authorized users.
- c) Store 7 days of data and products after product generation for retransmission.
- d) Send selected data, products, ancillary data, algorithms, and associated metadata to CLASS
- e) Transfer the GRB data stream from PG to MM
- f) Transfer the eGVAR data stream from PG to the GOES-N interface

The GOES-R Access Subsystem is comprised of the GOES-R Access Point and the 7-day temporary storage of the GOES-R core product set. The GOES-R Access Point is developed by OSD and is the operational user interface for ad-hoc data queries and for establishing or modifying data subscriptions or standing orders for machine to machine delivery of data via "push" or "pull" distribution. All real-time and near real-time users accessing data via the GOES-R Access Point draw their data from the temporary (7 days or less) data store. The 7-day revolving temporary storage serves as the short-term access for fulfillment of ad hoc user requests for recent historical data via the GOES-R Access Point. For the services described in this paragraph, OSDPD has an interest in moving to an enterprise-wide solution for all NOAA missions. As such they will lead the development of this part of the PD element. The ESPC will receive data via the GOES-R Access Point for further tailoring as requested by ESPC users.

### **3.5.5 *Scientific Algorithms***

The process for developing scientific algorithms to produce individual L1b and L2+ products (Atmosphere, Land, Ocean, and Space Weather) will require the participation of multiple organizations (instrument vendors, Flight Project, AWG, GS contractor, and the GSP). After Government review, the Government will provide individual Algorithm Packages, containing the algorithm design documents, test data, and other information, to the GS contractor as GFP.



ID	Dev. Effort	Option	Requirement
GSFPS-1150			<b>4 GROUND SEGMENT WIDE REQUIREMENTS</b>
GSFPS-2430			<b>4.1 Overview</b>
GSFPS-1152			Section 4 specifies segment-wide operational, functional, and performance requirements, which are allocated to the GOES-R GS as an end-to-end system. Segment-wide requirements for facilities, security, reliability, maintainability, and availability (RMA), design and construction, verification and validation, and external interfaces are also included in this section.
GSFPS-1154			<b>4.2 Physical Deployment and Remote Operability</b>
GSFPS-2719			The GOES-R GS functionality will be installed and operated at three sites. The NOAA Satellite Operations Facility (NSOF) in Suitland, MD and the Wallops Command and Data Acquisition Station (WCDAS) at Wallops, VA, are facilities that host current GOES systems. Together they will serve as the GOES-R primary facilities for operations. The third site will be a geographically-diverse Remote Backup Facility (RBU), located at Fairmont, WV (TBR), which will host a subset of the GS functionality and enable continuity of operations.
GSFPS-1158			<b>4.2.1 Primary Facilities</b>
GSFPS-1160	All	Base	GS functionalities described in this GS F&PS, with exception of the RBU and connecting networks <b>shall</b> be deployed at the WCDAS and NSOF facilities ("the GS primary facilities").
GSFPS-3146	All	Base	The GS at NSOF <b>shall</b> include the primary Mission Management (MM), Enterprise Management (EM), and selected Product Generation (PG) and Product Distribution (PD) functions.
GSFPS-3147	GS Ktr, ANT (CCR-01430)	Base	The GS at WCDAS <b>shall</b> include the primary space communications services, EM and MM functions, and selected PG and PD functions.
GSFPS-1162	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> include all functionalities necessary for the production, RF uplink, and reception of GRB at the WCDAS facility.
GSFPS-1164	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> include all functionalities necessary for the reception of GRB at the NSOF facility.
GSFPS-1166	All (CCR-01290)	Base	The GS functionality resident at NSOF <b>shall</b> be operable from NSOF.
GSFPS-2946	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS functionality resident at WCDAS <b>shall</b> be operable from WCDAS.
GSFPS-1170	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS <b>shall</b> provide the capability to operate all WCDAS-deployed functionalities remotely from the NSOF.
GSFPS-2604	All	Base	The GS <b>shall</b> meet functional and performance specifications for two GOES-R satellites simultaneously except as noted in the element descriptions.
GSFPS-1172			<b>4.2.2 Remote Backup Facility</b>
GSFPS-1174	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS RBU functionality <b>shall</b> be deployed at Fairmont, WV (TBR).

ID	Dev. Effort	Option	Requirement
GSFPS-1176	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS RBU functionality <b>shall</b> be remotely operable from the NSOF.
GSFPS-2431	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS RBU functionality <b>shall</b> be remotely operable from the WCDAS.
GSFPS-1178	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS RBU functionality <b>shall</b> be operable from the GS RBU.
GSFPS-2605	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS RBU <b>shall</b> operate without on-site staff, except in the case of continuity of operations deployments.
GSFPS-1186	GS Ktr	Base	The GS RBU <b>shall</b> provide all PG functions necessary to produce KPPs identified in Appendix A.
GSFPS-1188	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> include all functionalities necessary for the production, RF uplink, and reception of GRB at the RBU.
GSFPS-1190	GS Ktr, OSO (CCR-01430)	Base	The GS RBU <b>shall</b> provide all PD functions necessary to distribute KPPs to AWIPS as specified in the GOES-R Series Ground Segment (GS) to Advanced Weather Interactive Processing System (AWIPS) Interface Requirements Document (IRD) (P417-R-IRD-0160). (CCR01366)
GSFPS-3103	GS Ktr, ANT, OSO (CCR-01430)	Base	<p>The GS <b>shall</b> be capable of supporting the following single functions or combination of functions at the RBU:</p> <ul style="list-style-type: none"> <li>a) Space - Ground Communications</li> <li>b) Command Generation and Telemetry Data Processing</li> <li>c) Raw (instrument) Data Processing to Level 0</li> <li>d) Mission Operations to include real-time console operations, offline engineering and trending, bus and instrument health and safety monitoring, anomaly detection and resolution and procedure development</li> <li>e) Signal Monitoring</li> <li>f) Mission Scheduling and Planning</li> <li>g) Orbit Determination and Maneuver Planning</li> <li>h) Image Navigation and Registration Monitoring</li> <li>i) Routine Instrument Calibration Support and Product Monitoring</li> <li>j) Production of Level 1b Products and GLM</li> <li>k) Generation of KPPs</li> <li>l) GRB Assembly and Rebroadcast</li> <li>m) Sectorized Product Distribution to AWIPS</li> <li>n) Archiving (e.g., telemetry, EM events)</li> <li>o) 5-day temporary revolving storage</li> <li>p) Distribution of data to CLASS</li> <li>q) HRIT/EMWIN uplink</li> <li>r) Enterprise Management (CCR-01457)</li> </ul>
GSFPS-1192			<b>4.3 Ground Segment Maintainability</b>
GSFPS-1204	All	Base	The GS design <b>shall</b> enable hardware and software maintenance of the GS while maintaining compliance with the functional and performance requirements of the GOES-R Series System.
GSFPS-1206	All	Base	The GS <b>shall</b> include diagnostic tools to support maintenance of all internal GS interfaces.
GSFPS-1208	All	Base	The GS <b>shall</b> include diagnostic tools to support maintenance of all external GS interfaces.

ID	Dev. Effort	Option	Requirement
GSFPS-2432	All	Base	All elements of the GS <b>shall</b> make all locally collected performance and status measurements available to EM.
GSFPS-2433	All	Base	All elements of the GS <b>shall</b> make all locally detected hardware and software anomaly reports available to EM.
GSFPS-2434	All	Base	All elements of the GS <b>shall</b> make resource operational status and performance data available to EM, including; resource utilization (processing, storage, network and communications status), processing throughput, equipment configuration and availability, data accounting, data processing status, and product status, to support operations, trending, and performance analyses.
GSFPS-3001	All (CCR-01430)	Base	The GS <b>shall</b> have the capability to export any operator designated file to removable media (e.g., thumb drive, compact disk, tape, etc.).
GSFPS-3002	All (CCR-01430)	Base	The GS <b>shall</b> have the capability to store any operator designated file to removable media (e.g., thumb drive, compact disk, tape, etc.).
GSFPS-1374	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> permit an operator to install or upgrade software from any site within the GS.
GSFPS-3003	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> enable access and inspection of software at any site, from any other site.
GSFPS-3004	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> enable modification of software at any site from any other site.
GSFPS-3005	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> enable testing of software at any site from any other site.
GSFPS-3006	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> enable distribution of software at any site, from any other site.
GSFPS-3133	All (CCR-01290)	Base	The GS <b>shall</b> provide information and diagnostic tools, to include an online knowledge base, to isolate faults internal to the GS.
GSFPS-1210			<b>4.4 Ground Segment Availability</b>
GSFPS-1212			Operational availability is the fraction of time that the GOES-R Ground Segment (or a specified functionality contained within) is fully functional over a discrete 30-day period. This includes the GOES-R facilities, antennas, and networks out to the extent of the demarcations as defined in the IRDs. Maximum time to restore service (MaxTTRS) requirements are considered to be met at the 99.9 percentile (e.g., if an outage occurs, there is a 0.999 probability that service will be restored within the specified interval).
GSFPS-1214	All	Base	The GS <b>shall</b> operate continuously for the life of the GOES-R System.
GSFPS-1216	All	Base	The GS <b>shall</b> have a minimum Operational Availability of 0.989 over the GOES-R System lifetime, except for functionality for which a higher Operational Availability has been specified.
GSFPS-2910	All	Base	The GS <b>shall</b> have a MaxTTRS of 120 minutes for functions other than those for which a shorter MaxTTRS has been specified.
GSFPS-2606	ANT (CCR-01430)		The GS <b>shall</b> have a minimum Operational Availability of 0.99988 for the set of antenna subsystem functions, averaged over a 30-day period.
GSFPS-2908	ANT (CCR-01430)		The GS <b>shall</b> have a MaxTTRS of 5 minutes for antenna functionality.

ID	Dev. Effort	Option	Requirement
GSFPS-1220	GS Ktr	Base	The GS <b>shall</b> have a minimum Operational Availability of 0.99988 for mission management functionality, averaged over a 30-day period.
GSFPS-2907	GS Ktr	Base	The GS <b>shall</b> have a MaxTTRS of 5 minutes for mission management functionality.
GSFPS-3007	GS Ktr	Base	The GS <b>shall</b> have a minimum Operational Availability of 0.99988 for functionality associated with the generation and GRB distribution of products, averaged over a 30-day period.
GSFPS-3008	GS Ktr	Base	The GS <b>shall</b> have a MaxTTRS of 5 minutes for functionality associated with the generation and GRB distribution of products.
GSFPS-1222	GS Ktr	Base	The GS <b>shall</b> have a minimum Operational Availability of 0.99861 for functionality associated with the generation of sectorized cloud and moisture imagery products, averaged over a 30-day period.
GSFPS-1224	GS Ktr, OSO (CCR-01430)	Base	The GS <b>shall</b> have a minimum Operational Availability of 0.99861 for functionality associated with the delivery of sectorized cloud and moisture imagery products, as specified in the GS to AWIPS IRD, to the AWIPS demarcation point, averaged over a 30-day period.
GSFPS-2909	GS Ktr, OSO (CCR-01430)	Base	The GS <b>shall</b> have a MaxTTRS of 60 minutes for functionality associated with sectorized cloud and moisture imagery products data collection, processing, and distribution to the AWIPS demarcation point.
GSFPS-2827	GS Ktr (CCR-01430)	Base	The GS <b>shall</b> have a minimum availability of 0.99 for components associated with the generation of non KPP Level 2+ products, averaged over a 30 day period.
GSFPS-2905	GS Ktr, GAS (CCR-01430)	Base	The GS <b>shall</b> have a minimum Operational Availability of 0.99, averaged over a 30-day period, for those functions associated with the distribution of End Products to the GOES-R Access Point.
GSFPS-3009	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS <b>shall</b> have no single point of failure at any site in mission management functionality.
GSFPS-2435	All	Base	The GS <b>shall</b> have no single point of failure at any site in L0, L1b, GLM, GRB, and sectorized cloud and moisture imagery product generation and distribution functionality.
GSFPS-2913	All	Base	The GS <b>shall</b> be designed such that a failure in any function of the system does not impact the ability of redundant, back-up, or contingency instances of the functionality to perform the function. (CCR01409)
GSFPS-2911	GS Ktr, ANT, OSO, GAS (CCR-01430)	Base	The GS <b>shall</b> isolate anomalies by function and by site.
GSFPS-1230	GS Ktr	Base	The GS <b>shall</b> initiate transmission of failover configuration messages for a given function to a functionality's backup site upon detection of a loss of that functionality at the primary site.

ID	Dev. Effort	Option	Requirement
GSFPS-3104	GS Ktr	Base	The GS <b>shall</b> be capable of issuing directives for failover to the RBU of any single function or combination of functions including the following: <ul style="list-style-type: none"> <li>a) Space - Ground Communications</li> <li>b) Command Generation and Telemetry Data Processing</li> <li>c) Raw (instrument) Data Processing to Level 0</li> <li>d) Real-time Mission Operations console operations</li> <li>e) Production of Level 1b Products and GLM Product</li> <li>f) Generation of KPPs</li> <li>g) GRB Assembly and Rebroadcast</li> <li>h) Sectorized Product Distribution to AWIPS</li> <li>i) Archiving (e.g., telemetry, EM events)</li> <li>j) 5-day temporary revolving storage</li> </ul>
GSFPS-3010	GS Ktr	Base	The GS <b>shall</b> complete failover to the RBU of any function supported by the RBU within 5 minutes of failover initiation unless failover sequence is intentionally halted.
GSFPS-2947	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS RBU <b>shall</b> be capable of transitioning to operational status within 5 minutes.
GSFPS-3011	GS Ktr, ANT (CCR-01430)	Base	The GS facilities <b>shall</b> maintain synchronization with each other such that historical data is not required to transition to operational status.
GSFPS-3012	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS RBU <b>shall</b> transition to backup status for a given function once the primary responsibility for that function has returned to the primary facility or upon intentional termination of a failover sequence.
GSFPS-1232	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS RBU <b>shall</b> retain primary responsibility for a function during handover back to the primary facility until successful handover has been completed.
GSFPS-1180	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS RBU <b>shall</b> be capable of operating independently of functionalities deployed at WCDAS and NSOF during failover events, while still meeting all applicable functional and performance requirements.
GSFPS-2603	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS <b>shall</b> be able to failover functionality between sites on a function-by-function basis, while maintaining continuity of operations.
GSFPS-1239			<b>4.5 Latency and Refresh</b>
GSFPS-1241			GS product latency and refresh requirements as applied from ingest from the OSD antenna IF switch to ingest of the GOES-R Access Subsystem and other external interfaces as defined in the appropriate IRDs, which vary by product, are located in Appendix A of this GS F&PS.
GSFPS-2437			GOES-R Access Subsystem-allocated Ground Latency requirements, which vary by product, are located in Appendix B of this GS F&PS. (CCR01291)
GSFPS-2948		0001	GS product latency and refresh requirements as applied from the OSD antenna IF switch to the ingest of the GOES-R Access Subsystem and other external interfaces as defined in the appropriate IRDs, which vary by product, are located in Appendix D of this GS F&PS.
GSFPS-3131			GS Antenna-allocated Latency requirements, which vary by product, are located in Appendix C of this GS F&PS. (CCR01291)

ID	Dev. Effort	Option	Requirement
GSFPS-3148			GS product latency and refresh requirements, as applied from the OSD antenna IF switch to the AWIPS demarcation point, are located in Appendix E of this GS F&PS.
GSFPS-3198	All	Base	The GS <b>shall</b> produce all End-Products in accordance with the definitions in Appendix A as applied through Appendices A-E. (CCR01292)
GSFPS-2786	All (CCR-01414)	Base	The GS <b>shall</b> capture, process, and store a minimum of 99.9% of all theoretically available observable data downlinked from each GOES-R satellite when the system is operationally available, averaged over a 30-day period.
GSFPS-2439	GAS (CCR-01430)		The GS GOES-R Access Subsystem <b>shall</b> meet the GOES-R Access Subsystem-allocated Ground Latency requirements in Appendix B when the system is operationally available. (CCR01291, CCR01414)
GSFPS-1245			<b>4.6 Verification and Validation</b>
GSFPS-1252	All	Base	The GS <b>shall</b> accommodate testing of both nominal operations and failure scenarios, including automated responses to out-of-limit conditions.
GSFPS-1254	All	Base	The GS <b>shall</b> include automated tests for validating and verifying GS functional capabilities and performance after repairs or modifications.
GSFPS-1256	All	Base	The GS <b>shall</b> permit an operator to monitor and control built-in tests.
GSFPS-1258	All	Base	The GS <b>shall</b> include monitoring test points and indicators to support function verification, performance analysis, and fault isolation.
GSFPS-1262	All	Base	The GS design <b>shall</b> prevent disruption to the operational system from activities such as upgrades, routine and preventive maintenance, internal integration and testing, and external interface testing.
GSFPS-1263			<b>4.7 Segment-wide Requirements</b>
GSFPS-2918	All	Base	The GS <b>shall</b> be designed to utilize the International System of Units (SI, metric measurement system), in concurrence with NPD 8010.2, Use of the SI (Metric) System of Measurement in NASA Programs.
GSFPS-2445	All	Base	The GS <b>shall</b> comply with the DOC/NOAA/NESDIS enterprise and security architectures and associated reference models.
GSFPS-3105	All (CCR-01290)	Base	The GS <b>shall</b> have the capability to retrieve stored and on-line data, files, messages, and information.
GSFPS-1264			<b>4.7.1 Security</b>
GSFPS-1266	All	Base	The GS <b>shall</b> comply with all security requirements for a Major Application rated as High Impact as outlined in NIST-SP-800-53, the Department of Commerce IT Security Program Policy and Minimum Implementation Standards, and the NOAA IT Security Manual.
GSFPS-2440	GS Ktr, ANT, OSO (CCR-01430)	Base	The GS <b>shall</b> have multi-layered security (Defense in Depth) as defined in NIST SP 800-82. (CCR01305, CCR01455)
GSFPS-3203	GS Ktr	Base	The GS <b>shall</b> be designed such that the mission management functionality meets all security controls recommended for a Control Network with stringent security requirements as defined in NIST SP 800-82. (CCR01305, CCR01455)



ID	Dev. Effort	Option	Requirement
GSFPS-3204	GS Ktr	Base	The GS mission management functionality <b>shall</b> comply with the security recommendations for a Supervisory Control and Data Acquisition (SCADA) system found in NIST SP 800-82. (CCR01455)
GSFPS-2441	All	Base	The GS <b>shall</b> operate correctly as intended on systems using National Checklist Program Common Configurations such as the Federal Desktop Core Configuration.
GSFPS-3118	All	Base	GS systems <b>shall</b> implement common security configurations using the following order of precedence: a) NOAA b) DOC c) NIST d) Defense Information Systems Agency (DISA) e) Center for Internet Security (CIS) (CCR01304)
GSFPS-2442	All	Base	The GS <b>shall</b> allow system operation, maintenance, update and/or patching of software without altering configuration settings from the approved National Checklist Program Common Configurations such as the Federal Desktop Core Configuration.
GSFPS-2443	All	Base	The GS <b>shall</b> be designed to enforce the principle of “least privilege” so that authenticated users are limited to accessing only those system objects required for the normal performance of their duties. (CCR01305)
GSFPS-1491	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> employ multi-factor identification and authentication that is separate from the administrative network, per NISTSP 800-82, Draft Guide to Industrial Control Systems (ICS) Security. (CCR01305)
GSFPS-3132	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> employ smart card login in accordance with Homeland Security Presidential Directive 12 (HSPD-12). (CCR01305)
GSFPS-3200	All	Base	The GS <b>shall</b> include anti-malware and Host-based Intrusion Prevention System (HIPS) functions within the development, integration and test, and operations environments. (CCR1304)
GSFPS-1267			<b>4.7.2 Telecommunications</b>
GSFPS-1269	All	Base	The GS <b>shall</b> operate per IPv6 standards as given in RFC2460 - Internet Protocol, Version 6 (IPv6) Specification.
GSFPS-2611	OSO		The GS command and control circuits <b>shall</b> have a service level rating of Critical.
GSFPS-2612	OSO		The GS data circuits <b>shall</b> have a service level rating of Routine.
GSFPS-2448	OSO		The GS circuits <b>shall</b> provide bandwidth to transport required products for all GOES-R series satellites.
GSFPS-2613	OSO		Each GS circuit procured <b>shall</b> satisfy the capacity, performance, and protocol specifications that are documented in the applicable interface control document (ICD).
GSFPS-3199	All	Base	The GS <b>shall</b> conduct all routine intra-element and inter-element communications via network connections. (CCR01341)
GSFPS-1271			<b>4.7.3 Accessibility</b>

ID	Dev. Effort	Option	Requirement
GSFPS-1273	All	Base	The GS <b>shall</b> be accessible to individuals with disabilities as required by Section 508 of the Rehabilitation Act (29 USC 749d) as amended.
GSFPS-1274	All	Base	The GS <b>shall</b> meet or exceed the requirements given in 36 CFR Parts 1193, Telecommunications Act Accessibility Guidelines and 1194, Electronic and Information Technology Accessibility Standards.
GSFPS-2615	All	Base	The GS <b>shall</b> provide the capability for the operator to send to displays, printers, and files any of the following: spacecraft, instrument, or Ground Segment data and information used or generated by a GS function.
GSFPS-1278			<b>4.7.4 Electromagnetic Interference</b>
GSFPS-1280	All	Base	The GS <b>shall</b> comply with the electromagnetic interference (EMI) requirements of FCC rules CFR 47, Part 15, Subpart B, Sections 15.107 and 15.109 for Class A or B conducted and radiated emissions.
GSFPS-1282			<b>4.7.5 Operational Integrity</b>
GSFPS-1284	All	Base	The GS <b>shall</b> perform all functions, including those occurring simultaneously, with no interference with or performance degradation of any other GOES-R segment functionality.
GSFPS-1286	All	Base	The GS <b>shall</b> perform all functions, including those occurring simultaneously, with no interference with or performance degradation of any other functionality within the GS.
GSFPS-1288	All	Base	The GS <b>shall</b> perform all functions, including those occurring simultaneously, with no interference with or performance degradation of any other NOAA ground system.
GSFPS-1289			<b>4.7.6 Time References</b>
GSFPS-1291	All (CCR-01430)	Base	The GS <b>shall</b> use the Coordinated Universal Time (UTC) reference for all time-of-day related data processing.
GSFPS-1293	All (CCR-01430)	Base	The GS <b>shall</b> provide time and date annotation with a resolution of at least 10 microseconds.
GSFPS-3013	All (CCR-01430)	Base	The GS <b>shall</b> synchronize all nodes at the primary facility utilizing the timing signal from the timing system resident at each respective primary facility location.
GSFPS-2449	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> synchronize all nodes at the RBU utilizing the timing signal from the timing system resident at the RBU.
GSFPS-2450	All (CCR-01430)	Base	No two nodes in the GS <b>shall</b> vary by more than 5 microseconds from the site master clock.
GSFPS-1294			<b>4.7.7 Data Processing Error Rate</b>
GSFPS-1296	All	Base	The GS <b>shall</b> process raw data through production with less than one error in 10E12 bits processed, averaged daily.
GSFPS-2616			<b>4.7.8 Extensibility, Modularity, and Scalability</b>
GSFPS-2617	All	Base	The GS <b>shall</b> be extensible to operate up to four (4) satellites simultaneously.
GSFPS-2618	All	Base	The GS <b>shall</b> be implemented such that all elements can be independently scalable by at least 300% to accommodate any future growth, including the exercise of contract options.

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.



ID	Dev. Effort	Option	Requirement
GSFPS-2622	All	Base	Individual GS computer processor CPU utilization <b>shall</b> not exceed 70%, averaged daily.
GSFPS-2623	All	Base	Individual GS computer processor memory utilization <b>shall</b> not exceed 50%, averaged daily.
GSFPS-2771	All	Base	The GS <b>shall</b> , with the baseline delivery as well as with deliveries associated with any exercised contract options, size all processing, storage and throughput for at least 50% reserve capacity of that necessary to meet performance requirements.
GSFPS-2625	All	Base	The GS <b>shall</b> use modular hardware (Line Replaceable Units) and software that allows changes and enhancements to be performed without interfering with GS operations.
GSFPS-2626	All	Base	GS hardware <b>shall</b> use functional modules that allow replacement to improve performance, reliability or for other reasons.
GSFPS-2764	All	Base	The GS <b>shall</b> be modular/plug-and-play such that it will accommodate individual algorithm changes, as well as the deletion of existing and the addition of new algorithms, without the need for recompilation of other software modules.
GSFPS-2792	All	Base	The GS <b>shall</b> be designed such that it is modular, extensible, extendable and open.
GSFPS-3014	All	Base	The GS <b>shall</b> provide the capability for increased automation of GS operations throughout the life of the program.
GSFPS-3092	All	Base	The GS development and Integration and Test (I&T) environments <b>shall</b> be independently and simultaneously fully functional from the IF Switch through the GS.
GSFPS-3093	All	Base	The GS elements <b>shall</b> each have independent and simultaneously fully functional Development and I&T environments from the element inputs through outputs, with the MM demarcation point at the IF Switch.
GSFPS-3121			<b>4.7.9 Configuration Management System</b>
GSFPS-3122	All	Base	The GS <b>shall</b> capture, manage, and update the baseline configuration of the GS hardware and software. (CCR01305)
GSFPS-3123	GS Ktr	Base	The GS configuration management system <b>shall</b> include maintenance history accounting that enables tracking, and reporting at the component, subsystem, element and GS levels.
GSFPS-3124	GS Ktr	Base	The GS configuration management system <b>shall</b> enable sharing/linking anomaly reporting and status, software build, and history information such that configuration management system information may be queried and reported by information (data fields) contained in each of those functions.

ID	Dev. Effort	Option	Requirement
GSFPS-3125	GS Ktr	Base	The GS configuration management system <b>shall</b> enable reporting and tracking of data by, at a minimum: <ul style="list-style-type: none"> <li>a) Anomaly/Incident Report Identifier</li> <li>b) Hardware/Software CI Identifier</li> <li>c) Hardware component identifier</li> <li>d) Subsystem identifier</li> <li>e) Element identifier</li> <li>f) Software Build Identifier</li> <li>g) Software Version Number</li> <li>h) COTS identifier/nomenclature</li> <li>i) Operator</li> <li>j) Date range</li> <li>k) Problem type</li> <li>l) Verification event</li> </ul>
GSFPS-3126	GS Ktr	Base	The GS configuration management system's anomaly tracking capability <b>shall</b> include, at a minimum, the capabilities of the existing anomaly tracking systems.
GSFPS-2819			<b>4.8 Development Environment</b>
GSFPS-2828	All (CCR-01430)	Base	The GS <b>shall</b> provide a development environment for GS software development and checkout for all GS elements.
GSFPS-2829	GS Ktr	Base	The GS development environment <b>shall</b> support L1b Calibration and Validation (Cal/Val), L1b algorithm maintenance, and L2+ algorithm/parameter maintenance as well as the software development for all GS elements.
GSFPS-2830	All (CCR-01430)	Base	The GS development environment <b>shall</b> be capable of hosting the GS operational baseline software.
GSFPS-2309	All (CCR-01430)	Base	The GS development environment <b>shall</b> be sized such that the simultaneous execution of all elements of the GS software baseline will meet operational performance requirements.
GSFPS-2914	GS Ktr, ANT (CCR-01430)	Base	The portion of the GS development environment at WCDAS <b>shall</b> provide access to all data necessary for the offline execution of any single process or set of processes (including implemented algorithms) nominally resident at WCDAS.
GSFPS-2831	GS Ktr	Base	The GS development environment <b>shall</b> provide the selectable capability to capture and store logs, configurations, performance data, and other artifacts associated with development activities.
GSFPS-2832	All (CCR-01430)	Base	The GS development environment <b>shall</b> provide tools to enable the change, recompilation, and execution of any segment/module of the source code from any GS element.
GSFPS-2833	All (CCR-01430)	Base	The GS development environment <b>shall</b> provide the capability to develop, modify and checkout the integrated operation of all GS databases, tables and configuration files.
GSFPS-2834	All (CCR-01430)	Base	The GS development environment <b>shall</b> utilize the same configuration management and version control tools as the operational environment.
GSFPS-2835	GS Ktr	Base	The portion of the GS development environment at NSOF <b>shall</b> have at least 25 TB of dedicated storage for use by the Government.

ID	Dev. Effort	Option	Requirement
GSFPS-2836	GS Ktr	Base	The portion of the GS development environment at WCDAS <b>shall</b> have at least 2 TB of dedicated storage.
GSFPS-2837	GS Ktr	Base	The GS development environment <b>shall</b> include C/C++ and Fortran 90/95 compilers.
GSFPS-2838	GS Ktr	Base	The GS development environment <b>shall</b> include Java, and Perl and shell scripting languages.
GSFPS-2839	All (CCR-01430)	Base	The GS development environment <b>shall</b> have the capability to export compiled code segments and associated configuration and other support files to the operational and integration and test (I&T) environments following established configuration management (CM) processes.
GSFPS-2840	All (CCR-01430)	Base	The GS development environment <b>shall</b> be physically or logically segregated from other GS environments such that data and developed/compiled code can only be pulled from or pushed to other GS environments.
GSFPS-2842	All (CCR-01430)	Base	The GS development environment <b>shall</b> provide tools to monitor and display GS software execution performance and compare relative to F&PS performance requirements.
GSFPS-2843	GS Ktr, ANT (CCR-01430)	Base	The GS development environment <b>shall</b> provide local workstation operator/developer access and control at WCDAS.
GSFPS-2844	All (CCR-01430)	Base	The GS development environment <b>shall</b> provide local workstation operator/developer access and control at NSOF.
GSFPS-2311	GS Ktr	Base	The GS development environment <b>shall</b> provide the capability to modify, execute, and checkout algorithms individually or in groups, to support the verification and validation of product quality requirements and product generation performance.
GSFPS-2738	All (CCR-01430)	Base	The GS development environment <b>shall</b> be physically or logically segregated from other GS environments such that instances of any portion of the GS software baseline executing on the development environment cannot interfere with nor degrade the performance of software executing on any other environment.
GSFPS-2317	GS Ktr	Base	The GS development environment <b>shall</b> provide the capability to capture, store, and export output of the offline execution of any single or set of algorithms.
GSFPS-3015	GS Ktr	Base	The GS development environment <b>shall</b> have the capability to replay Transfer Frames from the 5-day revolving temporary storage back as a separate virtual satellite flow.
GSFPS-2820	GS Ktr	Base	The GS development environment <b>shall</b> have access to engineering telemetry data as it becomes available to the GS.
GSFPS-2821			<b>4.8.1 Calibration/Validation / WCDAS Product Maintenance</b>
GSFPS-2847	GS Ktr	Base	The portion of the GS development environment located at WCDAS <b>shall</b> have local access to L0 data as it becomes available to the GS at WCDAS.
GSFPS-2848	GS Ktr	Base	The portion of the GS development environment at WCDAS <b>shall</b> have local access to all input and output data and products as they are processed by the GS.

ID	Dev. Effort	Option	Requirement
GSFPS-2849	GS Ktr	Base	The GS development environment <b>shall</b> be capable of producing products nominally generated at WCDAS from L0 data, using existing and modified implemented algorithms and calibration coefficients, via local operator/developer access at WCDAS.
GSFPS-2850	GS Ktr	Base	The portion of the GS development environment located at WCDAS <b>shall</b> be capable of ingesting and processing GOES-R compatible format L0 test data sets.
GSFPS-2851	GS Ktr	Base	The GS development environment <b>shall</b> have the Interactive Data Language (IDL) and image processing software (e.g. ENVI) installed.
GSFPS-2852	GS Ktr	Base	The portion of the GS development environment located at WCDAS <b>shall</b> have the capability to make and checkout changes to the calibration coefficients.
GSFPS-2853	GS Ktr	Base	The GS development environment <b>shall</b> provide the capability to make updated calibration coefficient databases available to the operational and I&T environments following established CM procedures.
GSFPS-2854	GS Ktr	Base	The portion of the GS development environment at WCDAS <b>shall</b> make products produced on the development environment available for analysis and local storage.
GSFPS-2855	All (CCR-01430)	Base	The GS development environment <b>shall</b> provide a removable media capability at each site.
GSFPS-2856	GS Ktr, ANT (CCR-01430)	Base	The GS development environment <b>shall</b> provide for security-compliant thin-client (virtual machine) access to the development environment from external algorithm maintenance or Cal/Val facilities. (Note: Thin client is defined to mean that no local software applications are transferred to or run on the remote client machine).
GSFPS-2313	GS Ktr	Base	The GS development environment <b>shall</b> provide access to all data necessary for the offline execution of any single L2+ algorithm or set of algorithms.
GSFPS-2915	GS Ktr	Base	The GS development environment <b>shall</b> host tools, provided by the Government to support algorithm maintenance and calibration /validation activities.
GSFPS-3102	GS Ktr	Base	The portion of the GS development environment at WCDAS <b>shall</b> be capable of ingesting and processing GOES-R compatible format L1b test data sets for those L2+ end-products nominally resident at WCDAS.
GSFPS-2822			<b>4.8.2 Level 2+ Algorithm Maintenance</b>
GSFPS-2857	GS Ktr	Base	The portion of the GS development environment located at NSOF <b>shall</b> provide local access to L1b and L2+ data and products from the GRB as they become available to the GS at NSOF. (CCR01286)
GSFPS-2858	GS Ktr	Base	The portion of the GS development environment located at NSOF <b>shall</b> provide access to operational L2+ products as they are produced.
GSFPS-2859	GS Ktr	Base	The portion of the GS development environment located at NSOF <b>shall</b> provide local access to ancillary data as it becomes available to the GS at NSOF.
GSFPS-2860	GS Ktr	Base	The portion of the GS development environment located at NSOF <b>shall</b> be capable of producing L2+ products using modified L2+ algorithms, modified algorithm parameters and alternate ancillary data.

ID	Dev. Effort	Option	Requirement
GSFPS-2861	GS Ktr	Base	The portion of the GS development environment located at NSOF <b>shall</b> be capable of ingesting and processing GOES-R compatible format L1b test data sets.
GSFPS-2862	GS Ktr	Base	The portion of the GS development environment located at NSOF <b>shall</b> make L2+ products produced on the development environment available for developer analysis and local storage in the development environment.
GSFPS-2863	GS Ktr	Base	The portion of the GS development environment located at NSOF <b>shall</b> have the capability to make and checkout changes to run-time configurable algorithm parameters on the development environment.
GSFPS-2864	GS Ktr	Base	The GS development environment <b>shall</b> provide the capability to export updated run-time configurable algorithm parameters to the operational and I&T environments following established CM procedures.
GSFPS-2823			<b>4.9 Integration and Test Environment</b>
GSFPS-2865	All (CCR-01430)	Base	The GS <b>shall</b> provide an environment to support software I&T for all GS elements.
GSFPS-2866	GS Ktr	Base	The GS I&T environment <b>shall</b> be capable of processing all GOES-R data.
GSFPS-3154	GS Ktr	Base	The GS I&T environment <b>shall</b> have access to engineering telemetry data as it becomes available to the GS.
GSFPS-2867	All (CCR-01430)	Base	The GS I&T environment <b>shall</b> provide operator access and control.
GSFPS-2868	All (CCR-01430)	Base	The GS I&T environment <b>shall</b> be sized such that the execution of all elements of the GS software baseline simultaneously will meet operational performance requirements.
GSFPS-2869	All (CCR-01430)	Base	The GS I&T environment <b>shall</b> be physically or logically segregated from other GS environments such that instances of any portion of the GS software baseline executing on the I&T environment cannot interfere with nor degrade the performance of software executing on any other environment.
GSFPS-3127	All (CCR-01430)	Base	The GS I&T environment <b>shall</b> utilize the same software configuration management and version control tools as the operational environment.
GSFPS-2870	All (CCR-01430)	Base	The GS I&T environment <b>shall</b> provide tools to monitor and display software execution performance and compare relative to GS-F&PS performance requirements.
GSFPS-2871	GS Ktr	Base	The GS I&T environment <b>shall</b> be capable of exporting product generation output data to the development environment.
GSFPS-2872	All (CCR-01430)	Base	The GS I&T environment <b>shall</b> be capable of the operational implementation of GS software, including databases and algorithms, following established configuration management processes, and without disruption of mission operations.
GSFPS-2319	GS Ktr	Base	The GS I&T environment <b>shall</b> have the capability to capture and store cumulative offline product generation output from 36 hours of continuous processing.
GSFPS-1246	All (CCR-01430)	Base	The GS I&T environment <b>shall</b> accommodate independent element and subsystem tests, end-to-end tests, integration and verification activities, certification and accreditation security tests, without interfering with ongoing operations.

ID	Dev. Effort	Option	Requirement
GSFPS-1248	All (CCR-01430)	Base	The GS I&T environment <b>shall</b> provide the selectable capability to capture and store logs, configurations, performance data, and other artifacts associated with test activities.
GSFPS-1250	All (CCR-01430)	Base	The GS I&T environment <b>shall</b> accommodate test and verification of planned modifications under operational-equivalent conditions.
GSFPS-1260	All (CCR-01430)	Base	The GS I&T environment <b>shall</b> accommodate input and output of test data via removable physical media.
GSFPS-2994			<b>4.10 Operator Human-Machine Interface</b>
GSFPS-3016	All (CCR-01430)	Base	The GS <b>shall</b> provide a capability for information entry and editing.
GSFPS-3017	GS Ktr	Base	The GS <b>shall</b> display any single page simultaneously and independently at any number of viewing locations, as designated by the operator.
GSFPS-3018	GS Ktr	Base	The GS <b>shall</b> provide the capability to create, customize, and maintain display page and graph definitions.
GSFPS-3019	All (CCR-01430)	Base	The GS <b>shall</b> provide for the definition of abbreviated keyboard entries for executing operator directives.
GSFPS-3020	GS Ktr	Base	The GS <b>shall</b> display up to ten (10) parameters on a single graph.
GSFPS-3021	All (CCR-01430)	Base	The GS <b>shall</b> have consistent operator human-machine interfaces for functions within the GS.
GSFPS-3022	All (CCR-01430)	Base	The GS <b>shall</b> provide access to available functions through a human-machine interface, allowing the operator to access tools and information and to perform actions.
GSFPS-3023	All (CCR-01430)	Base	The GS <b>shall</b> have consistent visual and audible alarms for segment, elements, and subsystems.
GSFPS-3024	All (CCR-01430)	Base	The GS <b>shall</b> generate event messages for all GS and satellite events.
GSFPS-1332	All (CCR-01430)	Base	The GS <b>shall</b> allow the operator to configure the format and contents of displays.
GSFPS-1334	All (CCR-01430)	Base	The GS <b>shall</b> display information in text and graphical formats.
GSFPS-1344	All (CCR-01430)	Base	The GS <b>shall</b> acknowledge operator inputs within 0.5 seconds.
GSFPS-1346	All (CCR-01430)	Base	The GS <b>shall</b> update displays of rapidly changing information at a maximum of twice per second.
GSFPS-1362	GS Ktr	Base	The GS <b>shall</b> permit an operator to enable and disable individual EM reporting status and alarms.
GSFPS-1444	All (CCR-01430)	Base	The GS <b>shall</b> produce formatted hardcopy of displays, files, logs, and query responses upon operator request.
GSFPS-1448	All (CCR-01430)	Base	The GS <b>shall</b> display notification of all non-nominal conditions to the GS operators.
GSFPS-3114	All (CCR-01430)	Base	The GS <b>shall</b> retain critical events on the display until acknowledged by the operator.
GSFPS-1452	All (CCR-01430)	Base	The GS <b>shall</b> generate notification messages indicating at least three (3) levels of severity, based on authorized operator-configurable conditions and criteria.



ID	Dev. Effort	Option	Requirement
GSFPS-2634	All (CCR-01430)	Base	The GS <b>shall</b> permit the display of a minimum of 20 active windows, including text and graphics displays, on a single operator session.
GSFPS-1654	All (CCR-01430)	Base	The GS <b>shall</b> provide for the tabular and graphical display of data according to default and operator-specified display characteristics.
GSFPS-1299			<b>5 ENTERPRISE MANAGEMENT REQUIREMENTS</b>
GSFPS-1301			<b>5.1 Overview</b>
GSFPS-1303			Section 5 specifies the requirements associated with the Enterprise Management (EM) functional element - those requirements pertaining to oversight and supervision of the whole GS.
GSFPS-1305			In the EM context, supervision is defined as the ability to monitor, report, and provide capability for an operator response to anomalous conditions. GS operators at all sites will have access to the EM functionality for insight to their local site and to the distributed GS components, infrastructure, and interfaces. As the EM functionality receives status and other information provided by the distributed GS functions, operators will be able to monitor, trend, and perform other supervisory activities. While direct control of various systems will be implemented within the individual elements, the EM function provides operators with necessary insight to manage the end-to-end GS.
GSFPS-1308			<b>5.2 General Enterprise Management</b>
GSFPS-2451	GS Ktr	Base	The GS <b>shall</b> collect a heartbeat status for all components (hardware and software) in the GS.
GSFPS-2452	GS Ktr	Base	The GS <b>shall</b> provide complete reports of data associated with all detected anomalies for all GS components (hardware and software) determined to be critical to the performance of the GS.
GSFPS-1310	GS Ktr	Base	The GS EM functions <b>shall</b> be interoperable with GOES-R elements located at facilities hosting GS functions.
GSFPS-1312	GS Ktr	Base	The GS <b>shall</b> provide EM functions to GS operators located at any facility hosting GS functions.
GSFPS-1314	GS Ktr	Base	The GS <b>shall</b> permit operators at each facility hosting GS functions to access EM functions for GS elements at that facility, independent of the connectivity status of the other facilities hosting GS functions.
GSFPS-2627	GS Ktr	Base	The GS <b>shall</b> capture event messages of EM events.
GSFPS-2628	GS Ktr	Base	The GS <b>shall</b> store event messages of all GS and satellite events for the life of the mission.
GSFPS-3106	GS Ktr	Base	The GS <b>shall</b> provide the capability for immediate element operator access to an operator-configurable subset of element-level events for a period of 90 days.
GSFPS-2629	GS Ktr	Base	The GS <b>shall</b> selectively filter EM event messages for forwarding to EM based on operator definition.
GSFPS-2630	GS Ktr	Base	The GS <b>shall</b> forward filtered event messages of EM events to the EM.
GSFPS-1360	GS Ktr	Base	The GS <b>shall</b> permit an operator to manually override any EM automated control process or operational constraint.

ID	Dev. Effort	Option	Requirement
GSFPS-1316			<b>5.2.1 Enterprise Management Data Management</b>
GSFPS-1318	GS Ktr	Base	The GS <b>shall</b> display EM data to GS operators located at any facility hosting GS functions.
GSFPS-1320	GS Ktr	Base	The GS <b>shall</b> provide for an operator retrieval of stored and online EM data.
GSFPS-1324	GS Ktr	Base	The GS <b>shall</b> export at operator request, selected EM data, EM logs, and software on removable physical media.
GSFPS-1326	GS Ktr	Base	The GS <b>shall</b> retrieve, display, export, store for the life of the mission, and print operator-selected EM logs, EM reports, and EM data associated with all GS and satellite events.
GSFPS-1336	GS Ktr, GAS (CCR-01430)	Base	The GS <b>shall</b> monitor and display the GOES-R Access Point interface status.
GSFPS-1338	GS Ktr	Base	The GS <b>shall</b> display any EM-generated report via the operator HMI.
GSFPS-1340	GS Ktr	Base	The GS <b>shall</b> generate reports of operator-selected EM data for an operator-selected time-span.
GSFPS-3107	GS Ktr	Base	The GS <b>shall</b> have the capability to retrieve, display, trend, export (reports), store for the life of the mission, and print (reports) of performance measurements.
GSFPS-2731	All (CCR-01430)	Base	The GS <b>shall</b> require operator action to recover from manual interventions.
GSFPS-1342			<b>5.2.2 Enterprise Management Performance</b>
GSFPS-1348	All (CCR-01430)	Base	The GS <b>shall</b> provide operator notification of any monitored non-nominal condition within three seconds (3-seconds) of detection of the condition.
GSFPS-1350	GS Ktr	Base	The GS <b>shall</b> retrieve and display within 10 seconds operator selected EM data and logs created within the last 90 days.
GSFPS-1352			<b>5.3 Enterprise Supervision</b>
GSFPS-1358	GS Ktr	Base	The GS <b>shall</b> concurrently supervise the GS functions located at all facilities hosting GS functions.
GSFPS-1364	GS Ktr	Base	The GS <b>shall</b> validate operator ground directive requests against allowable configurations.
GSFPS-1366	All (CCR-01430)	Base	The GS <b>shall</b> permit an operator to configure GS network functions.
GSFPS-1370	All (CCR-01430)	Base	The GS <b>shall</b> permit an operator to change selected configurations for supervised hardware or software.
GSFPS-1372	GS Ktr	Base	The GS <b>shall</b> permit an operator to change selected EM configuration and control parameters.
GSFPS-1376	All (CCR-01430)	Base	The GS <b>shall</b> maintain established access privileges for different categories of GS operators and users.
GSFPS-1378	All (CCR-01430)	Base	The GS <b>shall</b> supervise access by operators at any GOES-R site.



ID	Dev. Effort	Option	Requirement
GSFPS-1382	GS Ktr	Base	The GS <b>shall</b> monitor and display GS resource operational status and performance, including; resource utilization (processing, storage, network and communications status), processing throughput, equipment configuration and availability, data accounting, data processing status, and product status, to support operations, trending, and performance analyses. (CCR01286)
GSFPS-1384	GS Ktr	Base	The GS <b>shall</b> monitor and display the status and performance of processes, including the satellite communications links, MM, EM, PG, PD, antenna subsystems, and external interfaces.
GSFPS-1388	GS Ktr	Base	The GS <b>shall</b> provide for correlation of failures to identify and process events such as cascading failures.
GSFPS-1390	GS Ktr	Base	The GS <b>shall</b> monitor applications communications status between components of the GS, both between facilities and within each facility.
GSFPS-1392	GS Ktr	Base	The GS <b>shall</b> monitor network communications status between components of the GS, both between facilities and within each facility.
GSFPS-1394	GS Ktr	Base	The GS <b>shall</b> capture and store CPU resource usage performance measurements for 90 days.
GSFPS-1396	GS Ktr	Base	The GS <b>shall</b> capture and store CPU loading performance measurements for 90 days.
GSFPS-1398	GS Ktr	Base	The GS <b>shall</b> capture and store memory usage performance measurements for 90 days.
GSFPS-1400	GS Ktr	Base	The GS <b>shall</b> capture and store disk access performance measurements (read and write) on a process basis for 90 days.
GSFPS-1404	GS Ktr	Base	The GS <b>shall</b> capture and store network usage performance measurements on a physical link basis for 90 days.
GSFPS-1406	GS Ktr	Base	The GS <b>shall</b> capture and store disk usage performance measurements on a hardware LRU basis for 90 days.
GSFPS-1420	GS Ktr	Base	The GS <b>shall</b> collect and store reliability events for satellite and GS LRUs for the life of the mission.
GSFPS-1422	GS Ktr	Base	The GS <b>shall</b> collect and store reliability events by hardware LRU for the life of the mission.
GSFPS-2950	GS Ktr	Base	The GS <b>shall</b> collect and store reliability events by software configuration item (CI) and version identifier for the life of the mission.
GSFPS-1424	GS Ktr	Base	The GS <b>shall</b> record planned outages for maintenance and upgrades as events.
GSFPS-1426	GS Ktr	Base	The GS <b>shall</b> collect and store reliability event duration for each reliability event for the life of the mission.
GSFPS-1428	GS Ktr	Base	The GS <b>shall</b> differentiate anomalies by severity level.
GSFPS-1430	GS Ktr	Base	The GS <b>shall</b> capture and store logs of network events, configuration changes, and status information for the life of the mission.
GSFPS-1432	GS Ktr	Base	The GS <b>shall</b> capture and store logs of events, configuration changes, and status information for the life of the mission.
GSFPS-1438	All (CCR-01430)	Base	The GS <b>shall</b> report GS performance against the latency and refresh criteria established in Appendix A, B, C, D, and E of the GS-F&PS.

ID	Dev. Effort	Option	Requirement
GSFPS-1440	GS Ktr	Base	The GS <b>shall</b> provide the capability to perform short- and long-term trend analysis of system, network, and communications performance.
GSFPS-1442	GS Ktr	Base	The GS <b>shall</b> provide the capability to perform analysis of the resource impact of system, network, and communications modifications, enhancements, and reallocations.
GSFPS-1450	GS Ktr	Base	The GS <b>shall</b> page designated personnel of non-nominal conditions and alerts (e.g., satellite, instrument, and GS conditions, alerts, and alarms) based on operator defined recipients.
GSFPS-1454	GS Ktr	Base	The GS <b>shall</b> annotate and display notification messages with time and date of generation.
GSFPS-1456	GS Ktr	Base	The GS <b>shall</b> store notification messages in a way that enables retrieval by operator-selectable attributes, including type, time, and text string, anomalous component identification.
GSFPS-1458	GS Ktr	Base	The GS <b>shall</b> maintain visual notifications until the non-nominal condition is cleared.
GSFPS-3108	GS Ktr	Base	The GS <b>shall</b> store notification messages for a period of 90 days.
GSFPS-1462	GS Ktr	Base	The GS <b>shall</b> capture and store fault isolation information at the GS system and subsystem level, for both hardware and software CIs, for a period of 90 days.
GSFPS-1464	GS Ktr	Base	The GS <b>shall</b> autonomously evaluate all supervised elements to identify anomalous conditions.
GSFPS-1466	GS Ktr	Base	The GS <b>shall</b> autonomously initiate diagnostics to aid in isolating internal faults, using safeguards to prevent diagnostic operations from affecting other operations.
GSFPS-1468	GS Ktr	Base	The GS <b>shall</b> send fault recovery directives to GS systems and subsystems.
GSFPS-1470	GS Ktr	Base	The GS <b>shall</b> provide information to isolate faults between GS systems and external interfaces.
GSFPS-2824	GS Ktr	Base	The GS <b>shall</b> supervise integration and test environment functions.
GSFPS-2845	GS Ktr	Base	The GS <b>shall</b> supervise development environment functions.
GSFPS-1471			<b>5.4 Common Support Services</b>
GSFPS-1489	GAS (CCR-01430)		The GS <b>shall</b> make user account information accessible to GS operations personnel for queries and EM report generation.
GSFPS-1495			<b>5.5 Ground Segment Infrastructure</b>
GSFPS-1496			<b>5.5.1 External Interface Supervision</b>
GSFPS-1498	GS Ktr	Base	The GS <b>shall</b> supervise GS interfaces to external elements, up to the GOES-R demarcation as defined in the GS IRDs.
GSFPS-1500	GS Ktr	Base	The GS <b>shall</b> supervise applications communications status between external elements and the GS.
GSFPS-1502	GS Ktr	Base	The GS <b>shall</b> supervise network communications status between external elements and the GS.

ID	Dev. Effort	Option	Requirement
GSFPS-1503			<b>5.5.2 Ground Segment Security Monitoring</b>
GSFPS-1505	GS Ktr	Base	The GS <b>shall</b> manage operational networks consistent with all security and access control requirements.
GSFPS-1509	GS Ktr	Base	The GS <b>shall</b> alert operations personnel of security incidents.
GSFPS-1511	GS Ktr	Base	The GS <b>shall</b> correlate data from GS specific host-based and network-based intrusion prevention and detection system and firewalls.
GSFPS-1514			<b>6 MISSION MANAGEMENT REQUIREMENTS</b>
GSFPS-1516			<b>6.1 Overview</b>
GSFPS-1518			Section 6 specifies the Mission Management (MM) function of the GOES-R GS. MM comprises the hardware, software, and mission operations support functions required to safely and reliably control and communicate with the satellite, monitor satellite systems performance, and capture all raw instrument data necessary for production of mission data.
GSFPS-1520			<b>6.2 Operational View</b>
GSFPS-1522			MM encompasses all operational functions of the spacecraft and instruments as follows: <ul style="list-style-type: none"> <li>a) Mission operations to include: console operations, offline engineering and trending, bus and instrument engineering telemetry and performance monitoring, anomaly detection and resolution, procedure development, spacecraft resource accounting, special operation.</li> <li>b) Spacecraft telemetry data storage for the life of the mission and remote access to telemetry.</li> <li>c) Mission planning and scheduling.</li> <li>d) Spacecraft navigation (orbit and attitude determination and maneuver planning).</li> <li>e) Space-Ground communications.</li> <li>f) Antennas.</li> <li>g) Uplink services and monitoring.</li> <li>h) Downlink services and monitoring.</li> <li>i) Raw instrument data pre-processing and temporary storage.</li> <li>j) Level 0 (L0) processing.</li> <li>k) Image Navigation and Registration (INR) operations.</li> <li>l) Routine instrument calibration and L1b product monitoring.</li> <li>m) Flight Software (FSW) management.</li> <li>n) Flight operations simulation</li> </ul>
GSFPS-1548			<b>6.3 General Mission Management</b>
GSFPS-1550	GS Ktr	Base	The GS <b>shall</b> manage the GOES-R Satellite Series throughout the life of the mission.
GSFPS-2454	GS Ktr	Base	The GS <b>shall</b> maintain the Satellite Command and Telemetry Databases for the life of the mission.
GSFPS-1552	GS Ktr	Base	The GS <b>shall</b> perform satellite instrument calibration.
GSFPS-1554	GS Ktr	Base	The GS <b>shall</b> perform mission planning and scheduling.

ID	Dev. Effort	Option	Requirement
GSFPS-2455	GS Ktr	Base	The GS <b>shall</b> collect performance measurements on MM including telemetry (TLM) limits, event messages, command (CMD) configurations, RF/IF signal quality, continuity and status.
GSFPS-2456	GS Ktr	Base	The GS <b>shall</b> report on MM performance measurements.
GSFPS-2631	GS Ktr	Base	The GS <b>shall</b> accommodate a minimum of 100 concurrent MM operator sessions, each capable of performing real-time commanding and telemetry monitoring, spacecraft operations, scheduling, and off-line telemetry analysis functions.
GSFPS-2632	GS Ktr	Base	The GS MM software <b>shall</b> be capable of supporting a minimum of four separate GOES-R Series satellites.
GSFPS-2633	GS Ktr	Base	The GS <b>shall</b> provide a configuration monitoring function to monitor the status and send configuration directives to all MM components and subsystems.
GSFPS-3026	GS Ktr	Base	The GS <b>shall</b> display a new page, complete with data within 3 seconds of its selection by the operator.
GSFPS-3027	GS Ktr	Base	The GS <b>shall</b> perform reassignment of a workstation configuration from one spacecraft to another within 30 seconds of an operator directive.
GSFPS-3028	GS Ktr	Base	The GS <b>shall</b> provide continuity of Mission Management workstation displays and processing before/after an operator log-off/log-on for the purpose of gap free change of operators.
GSFPS-1558	GS Ktr	Base	The GS <b>shall</b> display MM data on an operator-selectable periodic basis.
GSFPS-1560	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> capture logs of all operator inputs.
GSFPS-2458	GS Ktr	Base	The GS <b>shall</b> store and have the capability to retrieve, display, and generate and export reports of all operator inputs for 90 days.
GSFPS-3087	GS Ktr	Base	The GS <b>shall</b> provide the capability for operators to access the GS Satellite Telemetry and Command Databases from all GS locations.
GSFPS-3088	GS Ktr	Base	The GS <b>shall</b> manage the configuration of the contents of the Satellite Telemetry and Command Databases.
GSFPS-3089	GS Ktr	Base	The GS <b>shall</b> provide an XTCE-compliant ingest/export function/interface for the Satellite Telemetry and Command Databases.
GSFPS-3090	GS Ktr	Base	The GS <b>shall</b> provide a validation function for the Satellite Telemetry and Command Databases.
GSFPS-3091	GS Ktr	Base	The GS <b>shall</b> perform line-by-line syntax checking and display of all commands and ground directives.
GSFPS-3095	GS Ktr	Base	The GS <b>shall</b> configuration control all mission products (e.g., schedules, spacecraft commands, command loads, and flight software) stored and created within the GS.
GSFPS-3096	GS Ktr	Base	The GS <b>shall</b> import, process, and store command procedures developed externally using the GS scripting language logic statements and command blocks derived from the Satellite Telemetry and Command Database.
GSFPS-3138	GS Ktr	Base	The GS <b>shall</b> manage the GOES-R Mission Operations Database (MODB).

ID	Dev. Effort	Option	Requirement
GSFPS-3139	GS Ktr	Base	The GS <b>shall</b> provide the capability for operators to access the GOES-R MODB from all GS locations.
GSFPS-3157	GS Ktr	Base	The GS MODB <b>shall</b> be capable of being shared by all parties (operations and satellite/instrument teams) to maintain all satellite mission operations products.
GSFPS-3140	GS Ktr	Base	The GS <b>shall</b> provide a validation function for the GOES-R MODB.
GSFPS-3141	GS Ktr	Base	The GS <b>shall</b> provide an XTCE-compliant ingest/export function/interface for the GOES-R MODB.
GSFPS-3142	GS Ktr	Base	The MODB <b>shall</b> be delivered as a delimited ASCII file.
GSFPS-3158	GS Ktr	Base	The GS MODB <b>shall</b> conform to the GOES-R Flight Project Telemetry and Command Database Style Guidelines for command and telemetry mnemonic designations contained in the MODB.
GSFPS-3143	GS Ktr	Base	The MODB delivery <b>shall</b> include either a database schema defining tables and entries or an XML schema and tag definitions, as appropriate.
GSFPS-3159			The GS MODB will contain mission operations data items which may include: Commands, Telemetry, Packets, Conversions, Command APID Description, Database Version Name, Subsystem List, Real-Time Procedures, Instrument Tables, Instrument Symbols Of Interest, Instrument Action Codes, Instrument Onboard Scripts, Equations, Ground Data Points, Displays, Workspaces, Display Templates, Auto-Generated Displays, User, Workstation Permissions, Group Permissions, Spacecraft Onboard Processor Definitions, Spacecraft Memory Load Templates, EGSE Commands, EGSE Telemetry, EGSE Conversions, EGSE Auto-Gen Displays, EGSE Display Header Template, EGSE Test Sets, EGSE Subsystem List, Area Phase List.
GSFPS-1562			<b>6.4 Satellite Engineering Telemetry Monitoring</b>
GSFPS-1564	GS Ktr	Base	The GS <b>shall</b> monitor and display satellite engineering telemetry data.
GSFPS-1566	GS Ktr	Base	The GS <b>shall</b> make engineering telemetry available for real time display, analysis, limit checking, and storage for the life of the mission.
GSFPS-1572	GS Ktr	Base	The GS <b>shall</b> maintain telemetry limit sets for application to engineering telemetry parameters.
GSFPS-1574	GS Ktr	Base	The GS <b>shall</b> identify all out of limit conditions detected in satellite engineering telemetry.
GSFPS-1576	GS Ktr	Base	The GS <b>shall</b> generate event messages to communicate the status of the satellite and elements of the MM.
GSFPS-1578	GS Ktr	Base	The GS <b>shall</b> display an emulation of the onboard command execution process for absolute time sequence (ATS) and relative time sequence (RTS) command loads.
GSFPS-1580			<b>6.5 Event Logs</b>
GSFPS-2459	GS Ktr	Base	The GS <b>shall</b> capture event messages of satellite and mission management events.
GSFPS-2460	GS Ktr	Base	The GS <b>shall</b> selectively filter MM event messages based on operator designation for forwarding to EM.

ID	Dev. Effort	Option	Requirement
GSFPS-2461	GS Ktr	Base	The GS <b>shall</b> forward filtered event messages of satellite and mission management events to EM.
GSFPS-1584	GS Ktr	Base	The GS <b>shall</b> display satellite originated event messages.
GSFPS-1586	GS Ktr	Base	The GS <b>shall</b> generate an event history report on operator request.
GSFPS-1588	GS Ktr	Base	The GS <b>shall</b> selectively filter event messages for display, based on operator input.
GSFPS-1590	GS Ktr	Base	The GS <b>shall</b> maintain a database of operator-defined event types.
GSFPS-1592			<b>6.6 Remote Access to Mission Management Data</b>
GSFPS-1594	GS Ktr	Base	The GS <b>shall</b> permit an operator to retrieve and display spacecraft and instrument engineering telemetry through a secure interface from remote locations.
GSFPS-1596	GS Ktr	Base	The GS remote access function <b>shall</b> be configurable to provide other operational data that may not necessarily occur in the satellite engineering telemetry stream such as event and status messages and INR performance data.
GSFPS-1598	GS Ktr	Base	The GS remote access function <b>shall</b> retrieve historical satellite telemetry from the GS mission-life storage.
GSFPS-1600	GS Ktr	Base	The GS remote access function <b>shall</b> retrieve and display satellite telemetry as received by the MM element with no more than 5 second latency.
GSFPS-1602	GS Ktr	Base	The GS <b>shall</b> forward engineering telemetry to a secure operator access point for purposes of remote access.
GSFPS-2768	GS Ktr	Base	The GS <b>shall</b> use secure one-way links for spacecraft telemetry and command systems when connecting to public networks or to networks which have connections to public networks.
GSFPS-1604			<b>6.7 Anomaly Response</b>
GSFPS-2635	All (CCR-01430)	Base	The GS <b>shall</b> enable the operator to specify criteria for anomalies.
GSFPS-2737	All (CCR-01430)	Base	The GS <b>shall</b> enable the operator to create contingency procedures.
GSFPS-1606	GS Ktr, GAS (CCR-01430)	Base	The GS <b>shall</b> manage contingency operations procedures.
GSFPS-1608	All (CCR-01430)	Base	The GS <b>shall</b> execute contingency operations procedures.
GSFPS-1610	All (CCR-01430)	Base	The GS <b>shall</b> correlate detected anomalies with an applicable contingency procedure for the operator to activate.
GSFPS-2951	GS Ktr	Base	The GS <b>shall</b> store contingency operations procedures for the life of the mission.
GSFPS-1612	GS Ktr	Base	The GS <b>shall</b> enable the reporting of anomaly investigation results.
GSFPS-1614	GS Ktr	Base	The GS <b>shall</b> store anomaly investigation results for the life of the mission.



ID	Dev. Effort	Option	Requirement
GSFPS-1616			<b>6.8 Ground Directives</b>
GSFPS-1618	GS Ktr	Base	The GS <b>shall</b> produce ground directives that control elements within the GS.
GSFPS-1620	GS Ktr	Base	The GS <b>shall</b> create and store ground directives for inter-site control of GS elements.
GSFPS-1622	GS Ktr	Base	The GS <b>shall</b> execute ground directives.
GSFPS-1624	GS Ktr	Base	The GS <b>shall</b> graphically display ground directive execution.
GSFPS-1626	GS Ktr	Base	The GS <b>shall</b> display ground directives in text.
GSFPS-1628	GS Ktr	Base	The GS <b>shall</b> display ground directives synchronized with satellite commands.
GSFPS-1630	GS Ktr	Base	The GS <b>shall</b> capture and store logs of ground directives and execution for the life of the mission.
GSFPS-1632	GS Ktr	Base	The GS <b>shall</b> include ground directives and responses in the satellite event log as directed by the operator.
GSFPS-3029	GS Ktr	Base	The GS <b>shall</b> display to the operator a list of available telemetry paths for each satellite.
GSFPS-3030	GS Ktr	Base	The GS <b>shall</b> allow operator designation of the telemetry path for the source of telemetry for each satellite configuration.
GSFPS-3031	GS Ktr	Base	The GS <b>shall</b> display to the operator a list of available command paths to each satellite.
GSFPS-3032	GS Ktr	Base	The GS <b>shall</b> allow operator designation of the command path for each satellite configuration.
GSFPS-1634			<b>6.9 Engineering Telemetry</b>
GSFPS-1636	GS Ktr	Base	The GS <b>shall</b> receive engineering telemetry at the MM operations console within 0.5 seconds of ground receipt.
GSFPS-1638	GS Ktr	Base	The GS <b>shall</b> capture and store all logs generated by the processing of telemetry data for the life of the mission.
GSFPS-1640	GS Ktr	Base	The GS <b>shall</b> capture all out of limit telemetry conditions.
GSFPS-2465	GS Ktr	Base	The GS <b>shall</b> store logs of all out of limit telemetry conditions for the life of the mission.
GSFPS-2466	GS Ktr	Base	The GS <b>shall</b> have the capability to retrieve, display, export, store for the life of the mission, and print operator-selected spacecraft and instrument engineering telemetry, telemetry reports, and telemetry logs upon request of the operator.
GSFPS-1771	GS Ktr	Base	The GS <b>shall</b> process engineering telemetry as received (including normal mode and dwell mode telemetry).
GSFPS-2640	GS Ktr	Base	The GS <b>shall</b> have the capability to retrieve an echo of the full 4/32 kbps engineering data telemetry stream from the instrument raw data stream.
GSFPS-2641	GS Ktr	Base	The GS <b>shall</b> forward engineering telemetry parameters retrieved from the instrument raw data stream to the normal MM telemetry process for display, retrieval, and storage for the life of the mission.

ID	Dev. Effort	Option	Requirement
GSFPS-1568	GS Ktr	Base	The GS <b>shall</b> convert all satellite engineering telemetry data to engineering units.
GSFPS-1652	GS Ktr	Base	The GS <b>shall</b> permit operator-selectable display of stored satellite engineering telemetry data in engineering units or raw counts.
GSFPS-1644			<b>6.10 Engineering Analysis</b>
GSFPS-1646	GS Ktr	Base	The GS <b>shall</b> report spacecraft and instrument performance and trends based on collected engineering telemetry.
GSFPS-1648	GS Ktr	Base	The GS <b>shall</b> generate spacecraft and instrument performance trend analyses using real-time and stored telemetry.
GSFPS-1656	GS Ktr	Base	The GS <b>shall</b> have the ability to export data in a non-proprietary file format.
GSFPS-3033	GS Ktr	Base	The GS <b>shall</b> trend satellite life-limited resources (e.g., component ontime, battery charge/discharge cycles, propellant remaining) for the life of the mission.
GSFPS-1658			<b>6.11 Flight Software Maintenance</b>
GSFPS-2467	GS Ktr	Base	The GS <b>shall</b> manage access to spacecraft flight software.
GSFPS-1660	GS Ktr	Base	The GS <b>shall</b> maintain knowledge of the current state of onboard satellite (spacecraft and instrument) memory contents.
GSFPS-1662	GS Ktr	Base	The GS <b>shall</b> manage spacecraft flight software.
GSFPS-1664	GS Ktr	Base	The GS <b>shall</b> manage instrument flight software.
GSFPS-1666	GS Ktr	Base	The GS <b>shall</b> provide for operator-initiated memory dumps from satellite processors.
GSFPS-1668	GS Ktr	Base	The GS <b>shall</b> process memory dumps from satellite processors for the purpose of memory verification.
GSFPS-1670	GS Ktr	Base	The GS <b>shall</b> maintain a current copy of each flight software image.
GSFPS-1672	GS Ktr	Base	The GS <b>shall</b> maintain current copies of all satellite tables.
GSFPS-1674	GS Ktr	Base	The GS <b>shall</b> manage general satellite operations tables.
GSFPS-2636	GS Ktr	Base	The GS <b>shall</b> allow the operator to retrieve and utilize all stored copies of satellite flight software.
GSFPS-2923	GS Ktr	Base	The GS <b>shall</b> generate flight software loads for uplink to the satellite.
GSFPS-1676	GS Ktr	Base	The GS <b>shall</b> verify flight software and table loads.
GSFPS-1678	GS Ktr	Base	The GS <b>shall</b> import flight software patches from the Flight Software Development Environment (FSDE).
GSFPS-2770	GS Ktr	Base	The GS <b>shall</b> maintain synchronization of the spacecraft clock.
GSFPS-1680			<b>6.12 Satellite Simulator Interface</b>
GSFPS-1683			The Satellite Simulator will have an interface with the GS antenna subsystem at the IF switch.

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.



ID	Dev. Effort	Option	Requirement
GSFPS-2637	GS Ktr	Base	The GS <b>shall</b> provide an interface between the Satellite Simulator and the MM telemetry and command subsystem at the NSOF, WCDAS, and RBU sites.
GSFPS-1685	GS Ktr	Base	The GS <b>shall</b> interface with the satellite simulator via baseband data.
GSFPS-1687	GS Ktr	Base	The GS <b>shall</b> send data to the satellite simulator that simulates the Ground Segment communications to the Space Segment.
GSFPS-1689	GS Ktr	Base	The GS <b>shall</b> receive data from the satellite simulator that simulates the Space Segment to Ground Segment communications.
GSFPS-2468	GS Ktr	Base	The GS <b>shall</b> interface with satellite simulators to support simulation of at least three spacecraft simultaneously.
GSFPS-2638	GS Ktr	Base	The GS interface to the Satellite Simulator <b>shall</b> conform to the Spacecraft Simulator Design Document (GS-01).
GSFPS-1691			<b>6.13 Image Navigation and Registration</b>
GSFPS-1693			The Government will provide algorithms from the GOES-R earth pointing instrument vendors to either resample to a geo-referenced fixed grid coordinate system, for Advanced Baseline Imager (ABI) and Geostationary Lightning Mapper (GLM), or to provide geo-referenced information for INR processing. The Government will provide algorithms from the instrument vendors for the non-earth pointing instruments to geometrically locate to other coordinate systems. The ABI L1b algorithms are described in GOES-R Space Segment CDRL 80-1.
GSFPS-1695	GS Ktr	Base	The GS <b>shall</b> receive, from the Government, geometric calibration databases developed by the instrument vendor.
GSFPS-1697	GS Ktr	Base	The GS <b>shall</b> maintain geometric calibration databases.
GSFPS-1699	GS Ktr	Base	The GS <b>shall</b> geo-locate Earth-referenced instrument observation data in geodetic latitude and longitude.
GSFPS-3034	GS Ktr	Base	The GS <b>shall</b> locate Solar-referenced instrument observation data in the applicable reference frame.
GSFPS-3035	GS Ktr	Base	The GS <b>shall</b> perform landmarking of L1b images for visible and ground-viewing IR optical channels.
GSFPS-3036	GS Ktr	Base	The GS <b>shall</b> perform landmarking using a landmark database containing landmark locations and associated feature boundary data specific to operator designated sub-satellite locations.
GSFPS-1701			<b>6.13.1 Image Navigation and Registration Monitoring and Performance</b>
GSFPS-1703	GS Ktr	Base	The GS <b>shall</b> monitor spacecraft instrument INR performance.
GSFPS-2471	GS Ktr	Base	The GS <b>shall</b> autonomously monitor spacecraft instrument INR performance using predetermined landmarks from the landmark database.
GSFPS-1705	GS Ktr	Base	The GS <b>shall</b> display graphical, textual, and event messages related to INR performance parameters.
GSFPS-1707	GS Ktr	Base	The GS <b>shall</b> determine corrections to INR parameters.

ID	Dev. Effort	Option	Requirement
GSFPS-1709	GS Ktr	Base	The GS <b>shall</b> report INR performance.
GSFPS-1711	GS Ktr	Base	The GS <b>shall</b> store INR performance data and processing parameters.
GSFPS-2472	GS Ktr	Base	The GS <b>shall</b> trend INR performance data for an operator-defined interval.
GSFPS-2245	GS Ktr	Base	The GS <b>shall</b> monitor the performance of the GOES-R Series system with respect to the image radiometry, geometry and temporal registration.
GSFPS-3037	GS Ktr	Base	The GS <b>shall</b> be capable of extracting and storing pre-defined landmark regions of geo-referenced instrument detector sample data (i.e., prior to a function such as resampling).
GSFPS-3038	GS Ktr	Base	The GS <b>shall</b> perform landmark recognition and measurement, by operator request, from previously stored geo-referenced instrument detector sample data.
GSFPS-3134	GS Ktr	Base	The GS <b>shall</b> monitor the performance characteristics of ABI, GLM and SUVI Image Navigation and Registration consistent with the respective instrument Performance and Operational Requirements Documents (PORDs).
GSFPS-3135	GS Ktr	Base	The GS <b>shall</b> manage ABI, GLM and SUVI Image Navigation and Registration ground-computed parameters, orbital elements and associated data consistent with the performance requirements of the instruments as described in the respective PORDs.
GSFPS-3136	GS Ktr	Base	The GS <b>shall</b> monitor the performance of the GOES-R Series system with respect to the image radiometry, geometry and temporal registration at a level of accuracy, precision, quantity, and frequency necessary to validate the instrument performance as described in their respective PORDs.
GSFPS-1713			<b>6.14 GRB Product Monitoring</b>
GSFPS-1715	GS Ktr	Base	The GS <b>shall</b> display operator selectable data and imagery from the received GRB data.
GSFPS-1717	GS Ktr	Base	The GS <b>shall</b> assess and report the quality of instrument radiometric performance.
GSFPS-2755	GS Ktr	Base	The GS <b>shall</b> assess and report the quality of performance for all instruments.
GSFPS-2474	GS Ktr	Base	The GS <b>shall</b> display imagery from the received GRB data selectable by source and band.
GSFPS-1723	GS Ktr	Base	The GS <b>shall</b> assess and report the quality of the received GRB data.
GSFPS-2759	GS Ktr	Base	The GS <b>shall</b> be capable of monitoring any data item contained within the GRB data stream.
GSFPS-2473	GS Ktr	Base	The GS <b>shall</b> receive GRB data as relayed from the GOES R Series satellites.
GSFPS-1724			<b>6.15 Command Operations</b>
GSFPS-2475	GS Ktr	Base	The GS <b>shall</b> process commands by satellite ID.
GSFPS-2924	GS Ktr	Base	The GS <b>shall</b> generate commands for uplink to the satellite.

ID	Dev. Effort	Option	Requirement
GSFPS-2476	GS Ktr	Base	The GS <b>shall</b> authorize only one command console to command any one GOES-R Series satellite at a time.
GSFPS-2477	GS Ktr	Base	The GS <b>shall</b> complete a switchover of any non-command mode operator position to command mode within one minute of operator initiation of the action to switch.
GSFPS-1730	GS Ktr	Base	The GS <b>shall</b> generate real time commands.
GSFPS-1732	GS Ktr	Base	The GS <b>shall</b> generate Relative Time command Sequences (RTS) for use in command loads.
GSFPS-2478	GS Ktr	Base	The GS <b>shall</b> manage RTSs.
GSFPS-2479	GS Ktr	Base	The GS <b>shall</b> provide the capability edit and validate RTSs.
GSFPS-1734	GS Ktr	Base	The GS <b>shall</b> generate Absolute Time command Sequences (ATS) for use in command loads.
GSFPS-2480	GS Ktr	Base	The GS <b>shall</b> be able to maintain at least fifty ATSs for each satellite.
GSFPS-2481	GS Ktr	Base	The GS <b>shall</b> provide the capability for the operator to stop an ATS during execution.
GSFPS-2482	GS Ktr	Base	The GS <b>shall</b> provide tools for the development, modification, and deletion of ATSs.
GSFPS-2483	GS Ktr	Base	The GS <b>shall</b> be capable of nesting command procedures to at least six levels.
GSFPS-2732	GS Ktr	Base	The GS <b>shall</b> be capable of restricting command authority to selected workstations.
GSFPS-2733	GS Ktr	Base	The GS <b>shall</b> provide tools for verification and validation of ATSs.
GSFPS-3111	GS Ktr	Base	The GS <b>shall</b> store ATSs and RTSs for the life of the mission.
GSFPS-2734	GS Ktr	Base	The GS <b>shall</b> be capable of transmitting encrypted commands upon operator direction.
GSFPS-2484	GS Ktr	Base	The GS <b>shall</b> provide a function to expand nested procedures within a parent procedure so that all steps taken are shown in the order to be executed in print and display.
GSFPS-1736	GS Ktr	Base	The GS <b>shall</b> generate stored command loads with an execution time span consistent with the satellite capability.
GSFPS-1738	GS Ktr	Base	The GS <b>shall</b> maintain in a database a selected subset of commands defined as "critical" commands.
GSFPS-3155	GS Ktr	Base	The GS <b>shall</b> have the capability to exclude hazardous commands from being executed.
GSFPS-1740	GS Ktr	Base	The GS <b>shall</b> confirm operator acknowledgement prior to execution of all critical commands.
GSFPS-1742	GS Ktr	Base	The GS <b>shall</b> preclude inadvertent and unauthorized satellite commanding.
GSFPS-1744	GS Ktr	Base	The GS <b>shall</b> perform database-defined prerequisite state checking based on telemetry before transmitting a real-time command.

ID	Dev. Effort	Option	Requirement
GSFPS-1746	GS Ktr	Base	The GS <b>shall</b> accommodate command generation functionality as defined in the GOES-R Spacecraft Functional and Performance Specification (P 417-R-PSPEC-0014) and Space Segment (SS) to Ground Located - Command, Control, and Communications Segment (GL-C3S) (P 417-R-IRD-0001) IRD.
GSFPS-1748	GS Ktr	Base	The GS <b>shall</b> be capable of transmitting unencrypted commands upon operator direction.
GSFPS-1750	GS Ktr	Base	The GS <b>shall</b> utilize a National Security Agency (NSA) or NIST certified encryption device compatible with the onboard decryptor to send commands to the satellite.
GSFPS-3039	GS Ktr	Base	The GS <b>shall</b> be capable of updating (add, change, or delete) any single command in an active command schedule, including revalidation, in no more than 30 seconds.
GSFPS-3040	GS Ktr	Base	The GS <b>shall</b> retransmit commands that have failed to load up to a specified number of retries.
GSFPS-3041	GS Ktr	Base	The GS <b>shall</b> take specified action (e.g., sound alarm, issue warning message, halt schedule) after the specified number of command retries have been exhausted.
GSFPS-3042	GS Ktr	Base	The GS <b>shall</b> provide the capability to enter commands from a keyboard at the IF interface to the antenna system.
GSFPS-3043	GS Ktr	Base	The GS <b>shall</b> provide limited raw and formatted telemetry display at the IF interface to the antenna system.
GSFPS-3044	GS Ktr	Base	The GS <b>shall</b> maintain a database of the path delays to the antenna aperture of the Ground Stations utilized for commanding each satellite.
GSFPS-3045	GS Ktr	Base	The GS <b>shall</b> provide continuity of satellite commanding through change of command authority from one workstation/console to another.
GSFPS-1752			<b>6.15.1 Command Verification</b>
GSFPS-1754	GS Ktr	Base	The GS <b>shall</b> verify by default all commands prior to being uplinked to the satellite.
GSFPS-1756	GS Ktr	Base	The GS <b>shall</b> verify stored command and memory (table) loads.
GSFPS-1758	GS Ktr	Base	The GS <b>shall</b> verify that all software, stored command, and table loads transmitted to the satellite have been properly stored on board.
GSFPS-1760	GS Ktr	Base	The GS <b>shall</b> have the capability to compare and confirm all flight software, stored command and table loads transmitted to the satellite.
GSFPS-1762	GS Ktr	Base	The GS <b>shall</b> verify from telemetry, command acceptance or rejection status of each command transmitted to the satellite.
GSFPS-1764	GS Ktr	Base	The GS <b>shall</b> verify via available telemetry that a command transmitted to the satellite produces a change in state consistent with successful command execution.
GSFPS-1766	GS Ktr	Base	The GS <b>shall</b> allow command verification to be disabled or enabled on an individual command basis.

ID	Dev. Effort	Option	Requirement
GSFPS-2485			<b>6.15.2 Ground Command Management</b>
GSFPS-2486	GS Ktr	Base	The GS <b>shall</b> provide command constraint checking consistent with the satellite telemetry and command database.
GSFPS-2487	GS Ktr	Base	The GS <b>shall</b> provide for a two-step commanding mode.
GSFPS-2488	GS Ktr	Base	The GS <b>shall</b> route all commands through the designated primary command path.
GSFPS-2489	GS Ktr	Base	The GS <b>shall</b> enable the operator to select an Absolute Time Sequence schedule to be run on the ground or on board.
GSFPS-2490	GS Ktr	Base	The GS <b>shall</b> enable the operator to switch from one schedule to another.
GSFPS-2491	GS Ktr	Base	The GS <b>shall</b> enable the operator to modify a schedule on the ground, upload it, and switch to the modified schedule.
GSFPS-2736	GS Ktr	Base	The GS <b>shall</b> transmit real time commands within 1 second of definition by the operator.
GSFPS-1767			<b>6.16 Telemetry</b>
GSFPS-1773	GS Ktr	Base	The GS <b>shall</b> interpret the value and quality flag of a telemetry point.
GSFPS-1775	GS Ktr	Base	The GS <b>shall</b> enable the operator to define and maintain in a database mission-critical parameter telemetry items (safety monitors).
GSFPS-1777	GS Ktr	Base	The GS <b>shall</b> monitor operator-defined mission-critical parameter telemetry items (safety monitors).
GSFPS-1779	GS Ktr	Base	The GS <b>shall</b> display operator-defined mission-critical parameter telemetry items (safety monitors).
GSFPS-1781	GS Ktr	Base	The GS <b>shall</b> activate a distinct audible and visual alarm based on an operator-defined set of monitored mission-critical parameter telemetry items (safety monitors).
GSFPS-1783	GS Ktr	Base	The GS <b>shall</b> receive and process high-fidelity simulated telemetry.
GSFPS-1785	GS Ktr	Base	The GS <b>shall</b> perform context-dependent telemetry processing.
GSFPS-1787	GS Ktr	Base	The GS <b>shall</b> perform data flagging for all telemetry parameters (including pseudo telemetry) when there has been no receipt of such telemetry for a period of time equivalent to an operator-specified multiple of the telemetry point's update rate.
GSFPS-1789	GS Ktr	Base	The GS <b>shall</b> alarm telemetry values that violate predefined database values (limit sets) as received.
GSFPS-1791	GS Ktr	Base	The GS <b>shall</b> allow adjustments by operators with the correct privileges for any telemetry limit value defined in the telemetry database, including pseudo telemetry.
GSFPS-1793	GS Ktr	Base	The GS <b>shall</b> permit operator-initiated limit adjustments, without permanent change to the telemetry database.
GSFPS-1795	GS Ktr	Base	The GS <b>shall</b> allow limit adjustments to be made in either raw or engineering units.
GSFPS-1797	GS Ktr	Base	The GS <b>shall</b> allow an operator to display the name of the active limit set.

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

ID	Dev. Effort	Option	Requirement
GSFPS-1799	GS Ktr	Base	The GS <b>shall</b> allow an operator to display the current limit values for any telemetry parameter.
GSFPS-1801	GS Ktr	Base	The GS <b>shall</b> allow the operator to disable and enable alarm messages.
GSFPS-1803	GS Ktr	Base	The GS <b>shall</b> indicate a change in state of bi-level telemetry parameters, as a feature of the limit set function.
GSFPS-1963	ANT (CCR-01430)		The GS <b>shall</b> monitor spacecraft telemetry to assess performance of the UPS including level of transponder power output and transponder state (off or on).
GSFPS-2009	GS Ktr	Base	The GS <b>shall</b> refresh telemetry displays at a rate consistent with satellite telemetry refresh rates.
GSFPS-2642			<b>6.16.1 Pseudo Telemetry</b>
GSFPS-2643	GS Ktr	Base	The GS <b>shall</b> generate derived “pseudo telemetry” parameters based on combined or single engineering telemetry data parameters processed through user-defined algorithms (including algebraic, trigonometric, and logical operators).
GSFPS-2644	GS Ktr	Base	The GS <b>shall</b> process, display, and store for the life of the mission pseudo telemetry in the same manner as normal satellite telemetry.
GSFPS-2645	GS Ktr	Base	The GS <b>shall</b> time-tag pseudo telemetry relative to the last received packet of the source telemetry parameter used in the algorithm.
GSFPS-2646	GS Ktr	Base	The GS <b>shall</b> update pseudo telemetry parameters at a frequency equal to the lowest frequency source telemetry parameter used in the algorithm.
GSFPS-2647	GS Ktr	Base	The GS <b>shall</b> provide an interface for operators to define pseudo telemetry algorithms.
GSFPS-2648	GS Ktr	Base	The GS <b>shall</b> permit user-defined pseudo telemetry items to be saved and accessed for all real time telemetry processing.
GSFPS-2649	GS Ktr	Base	The GS <b>shall</b> permit the ad-hoc definition of pseudo telemetry algorithms by an operator ("on-the-fly") under a user session that will be processed until that session is closed.
GSFPS-2011	GS Ktr	Base	The GS <b>shall</b> have the capability to store at least 1000 pseudo-telemetry operator-defined algorithms as they are generated in real-time and near real-time processing.
GSFPS-2650	GS Ktr	Base	The GS <b>shall</b> permit ad-hoc defined pseudo telemetry algorithms to be saved.
GSFPS-3046			<b>6.16.2 Satellite State Monitoring</b>
GSFPS-3047	GS Ktr	Base	The GS <b>shall</b> maintain an image of the current onboard status of each discrete commandable telemetered parameter.
GSFPS-3048	GS Ktr	Base	The GS <b>shall</b> compare the status of discrete commandable telemetry with the ground image to determine if an uncommanded change in state has occurred.
GSFPS-3049	GS Ktr	Base	The GS <b>shall</b> flag and report any uncommanded change in discrete telemetry in comparison with the ground image.
GSFPS-3050	GS Ktr	Base	The GS discrete telemetry ground image compare capability <b>shall</b> be configurable by operator directive.



ID	Dev. Effort	Option	Requirement
GSFPS-1805			<b>6.17 Mission Planning and Scheduling</b>
GSFPS-1807	GS Ktr	Base	The GS <b>shall</b> generate schedules of coordinated satellite operations, communications services, payload operations, and supporting functions for each in-flight satellite.
GSFPS-1809	GS Ktr	Base	The GS <b>shall</b> provide mission operations data for planning and scheduling including mission configuration, maneuver planning, and satellite activity prioritization.
GSFPS-1811	GS Ktr	Base	The GS <b>shall</b> plan and schedule satellite resources for routine mission operations.
GSFPS-1813	GS Ktr	Base	The GS <b>shall</b> plan and schedule special operations such as station keeping maneuvers, east-west, north-south yaw flips, thruster flushing, engineering or science investigations outside normal operations.
GSFPS-1815	GS Ktr	Base	The GS <b>shall</b> plan and schedule routine and special instrument calibration activities.
GSFPS-1817	GS Ktr	Base	The GS <b>shall</b> plan and schedule significant events and satellite maintenance resources up to 12 months in advance.
GSFPS-1819	GS Ktr	Base	The GS <b>shall</b> create command loads, memory (table) loads and command sequences to operate the satellite.
GSFPS-1821	GS Ktr	Base	The GS <b>shall</b> create command loads with overlap periods, such that the currently executing command load can initiate the command load awaiting execution.
GSFPS-2495	GS Ktr	Base	The GS schedule generation function <b>shall</b> provide schedule templates to permit building schedules for ground and stored command use.
GSFPS-2496	GS Ktr	Base	The GS schedule generation function <b>shall</b> perform line-by-line syntax checking of command files for verification.
GSFPS-2497	GS Ktr	Base	The GS <b>shall</b> provide a schedule execution and monitoring function which provides schedule shadowing for visual monitoring of onboard schedule command execution.
GSFPS-2651	GS Ktr	Base	The GS <b>shall</b> maintain a minimum of 200 mission plans simultaneously.
GSFPS-2652	GS Ktr	Base	The GS <b>shall</b> validate schedules.
GSFPS-1823	GS Ktr	Base	The GS <b>shall</b> constraint check command loads.
GSFPS-1825	GS Ktr	Base	The GS <b>shall</b> deconflict satellite maintenance schedules with operations.
GSFPS-1827	GS Ktr	Base	The GS <b>shall</b> coordinate the storage of ATS and RTS command sequences on board the satellite.
GSFPS-1829	GS Ktr	Base	The GS <b>shall</b> provide coordination of control from one sequence to another on board the satellite.
GSFPS-1831	GS Ktr	Base	The GS <b>shall</b> execute the procedures and rules used to perform planning and scheduling of the satellite.
GSFPS-2760	GS Ktr	Base	The GS <b>shall</b> generate and forward command schedules and schedule updates to the backup subsystem and confirm all transfers at the sending and receiving ends.



ID	Dev. Effort	Option	Requirement
GSFPS-3051	GS Ktr	Base	The GS <b>shall</b> provide schedule templates to allow building on-demand ABI scan command schedules based on those used for Mesoscale scans.
GSFPS-3052	GS Ktr	Base	The GS <b>shall</b> generate an ABI scan command schedule containing only the latitude and longitude coordinates of the center point of the requested ABI scene and the execution time.
GSFPS-3053	GS Ktr	Base	The GS <b>shall</b> use existing ABI scene swath tables for upload to the satellite.
GSFPS-3054	GS Ktr	Base	The GS <b>shall</b> generate new ABI scene swaths tables for upload to the satellite.
GSFPS-3055	GS Ktr	Base	The GS <b>shall</b> perform constraint checks to ensure that all ABI scene scans follow predefined rules to meet instrument performance requirements.
GSFPS-1833			<b>6.18 Space-Ground Functional Communications</b>
GSFPS-1839	ANT (CCR-01430)		The GS <b>shall</b> monitor the command uplink for the GOES-R series.
GSFPS-1841	ANT (CCR-01430)		The GS <b>shall</b> monitor the Data Collection Platform Receive (DCPR) pilot uplink for the GOES-R series.
GSFPS-1843	ANT (CCR-01430)		The GS <b>shall</b> monitor the Data Collection Command (DCPC) uplink for the GOES-R series.
GSFPS-1845	ANT (CCR-01430)		The GS <b>shall</b> monitor the uplink for GRB for the GOES-R series.
GSFPS-2653	ANT (CCR-01430)		The GS <b>shall</b> monitor the uplink for HRIT/EMWIN for the GOES-R series. (CCR-01457)
GSFPS-1849	ANT (CCR-01430)		The GS <b>shall</b> monitor real-time telemetry for the GOES-R series.
GSFPS-1851	ANT (CCR-01430)		The GS <b>shall</b> monitor the DCPR downlink for the GOES-R series.
GSFPS-1853	ANT (CCR-01430)		The GS <b>shall</b> monitor the instrument raw data downlink for the GOES-R series.
GSFPS-2498	ANT (CCR-01430)		The GS <b>shall</b> make all monitored communication link information available to MM. (CCR01416)
GSFPS-1855	GS Ktr	Base	The GS <b>shall</b> append a cyclical redundancy checking (CRC) integrity measure to instrument uploads consistent with the Space Segment (SS) to Ground Located - Command, Control, and Communications Segment (GL-C3S) (P 417-R-IRD-0001) IRD.
GSFPS-1857	GS Ktr	Base	The GS <b>shall</b> assess, maintain and report space-ground communications status, including data quality summary for all received data.
GSFPS-1859	GS Ktr	Base	The GS <b>shall</b> receive, process, and route all satellite data in real-time in accordance with Consultative Committee for Space Data System (CCSDS) data standards defined in the applicable documents.
GSFPS-2501	ANT (CCR-01430)		The GS <b>shall</b> communicate with the Space Segment consistent with the Space Segment (SS) to Ground Located - Command, Control, and Communications Segment (GL-C3S) (P 417-R-IRD-0001) IRD.
GSFPS-2657	GS Ktr	Base	The GS <b>shall</b> process all downlinks from a satellite concurrently.

ID	Dev. Effort	Option	Requirement
GSFPS-1863			<b>6.19 Launch Segment Interface</b>
GSFPS-1865	GS Ktr	Base	The GS <b>shall</b> receive launch data from the Launch Segment (LS), including: launch time, time of first contact, vectors, and ephemeris, as described in LS vendor documentation.
GSFPS-1867	GS Ktr	Base	The GS <b>shall</b> receive satellite data from the LS, while integrated at the launch site, as described in LS vendor documentation.
GSFPS-1869	GS Ktr	Base	The GS <b>shall</b> command the satellite through the LS interface.
GSFPS-1875	GS Ktr	Base	The GS <b>shall</b> send commands via the LS ground network.
GSFPS-1877	GS Ktr	Base	The GS <b>shall</b> receive telemetry via the LS ground network.
GSFPS-1879	GS Ktr	Base	The GS <b>shall</b> receive ranging from the LS ground network.
GSFPS-1881	GS Ktr	Base	The GS <b>shall</b> send orbital element or other acquisition data to the LS ground network.
GSFPS-1871			<b>6.20 Space Segment Interface</b>
GSFPS-2499	GS Ktr	Base	The GS <b>shall</b> receive engineering telemetry data from the satellite in the factory as described in the associated Flight Segment test plan and test procedure.
GSFPS-2500	GS Ktr	Base	The GS <b>shall</b> send satellite commands / command loads to the satellite in the factory as described in the associated Flight Segment test plan and test procedure.
GSFPS-1883			<b>6.20.1 High Rate Information Transmission / Emergency Managers Weather Information Network Interface (CCR-01457)</b>
GSFPS-1885	ANT (CCR-01430)		The GS <b>shall</b> interface with the HRIT/EMWIN service in accordance with the Ground Segment (GS) to High Rate Information Transmission / Emergency Managers Weather Information Network (EMWIN) Interface Requirements Document (IRD) (P 417-R-IRD-0095). (CCR-01457)
GSFPS-2659	ANT (CCR-01430)		The GS <b>shall</b> uplink HRIT/EMWIN signal as specified in the SS to HRIT/EMWIN IRD (P 417-R-IRD-0168). (CCR-01457)
GSFPS-1889			<b>6.20.2 Data Collection System Interface</b>
GSFPS-1891	ANT (CCR-01430)		The GS <b>shall</b> interface with DCS in accordance with the Ground Segment (GS) to Data Collection System (DCS) Interface Requirements Document (IRD) (P 417-R-IRD-0094).
GSFPS-2952	ANT (CCR-01430)		The GS <b>shall</b> uplink DCS data streams to the Satellite.
GSFPS-2670	ANT (CCR-01430)		The GS at the WCDAS <b>shall</b> receive test messages from the DAPS at the WCDAS site in accordance with the GS to DCS IRD (P-417-R-IRD-0094).
GSFPS-2671	ANT (CCR-01430)		The GS at the WCDAS <b>shall</b> transmit test messages, similar to Data Collection Platform Reports (DCPRs), in any DCPR channel to the Space Segment as specified in the DCPR's Certificate Standards in accordance with the DCS to SS IRD (417-R-IRD-0005).

ID	Dev. Effort	Option	Requirement
GSFPS-2672	ANT (CCR-01430)		The GS at the WCDAS <b>shall</b> receive test messages, similar to DCPRs, from the Space Segment in accordance with the SS to GS IRD (417-R-IRD-0005).
GSFPS-2673	ANT (CCR-01430)		The GS at the WCDAS site <b>shall</b> forward received test messages, similar to DCPRs, to the DAPS at the WCDAS site.
GSFPS-1904			<b>6.21 Antenna</b>
GSFPS-1905			The GS antenna subsystem(s), including the RF and IF interfacing equipment, will be provided as GFP to the contractor.
GSFPS-1906	GS Ktr	Base	The GS signal path connections (uplink and downlink) <b>shall</b> interface to the antenna subsystem at the Government-furnished IF switch.
GSFPS-1908	GS Ktr	Base	The GS <b>shall</b> interface to the antenna subsystem control component to send antenna control signals to the antenna subsystem.
GSFPS-1910	GS Ktr	Base	The GS <b>shall</b> interface to the antenna subsystem control component to receive antenna subsystem status data.
GSFPS-1912	GS Ktr	Base	The GS <b>shall</b> monitor and report antenna equipment status, event and alarm information.
GSFPS-2504	ANT (CCR-01430)		The GS <b>shall</b> make antenna equipment status, event and alarm information available to EM.
GSFPS-1914	ANT (CCR-01430)		The GS antennas <b>shall</b> self-check.
GSFPS-1916	ANT (CCR-01430)		The GS <b>shall</b> provide redundant L, S, and X - band downlink antenna paths.
GSFPS-1918	ANT (CCR-01430)		The GS antenna primary and redundant downlink paths <b>shall</b> be hot and available as the operational downlink.
GSFPS-1920	ANT (CCR-01430)		The GS antenna(s) <b>shall</b> provide redundant antenna satellite uplink paths.
GSFPS-1922	ANT (CCR-01430)		The GS antenna(s) operational path(s) <b>shall</b> be remotely selectable through GS control.
GSFPS-1924	ANT (CCR-01430)		The GS antennas <b>shall</b> program-track satellites.
GSFPS-2675	ANT (CCR-01430)		The GS antennas <b>shall</b> auto-track satellites.
GSFPS-1926	ANT (CCR-01430)		The GS <b>shall</b> monitor, report, and control antenna operational parameters.
GSFPS-2676	GS Ktr	Base	The GS <b>shall</b> remotely monitor, report, and control antenna operational parameters.
GSFPS-1928	ANT (CCR-01430)		The GS antenna subsystem <b>shall</b> perform ranging ground loop calibration while performing nominal operations.
GSFPS-2754	GS Ktr	Base	The GS <b>shall</b> be able to configure the tracking mode of the antenna.
GSFPS-3056	ANT (CCR-01430)		The GS antenna subsystems <b>shall</b> meet the Antenna-allocated Latency requirements of Appendix C when the system is operationally available. (CCR-01291, CCR-01414)
GSFPS-1930			<b>6.22 Uplink Services</b>
GSFPS-1932	ANT (CCR-01430)		The GS <b>shall</b> generate uplink stream for commanding.

ID	Dev. Effort	Option	Requirement
GSFPS-1934	ANT (CCR-01430)		The GS <b>shall</b> generate uplink stream GRB format products in real-time for rebroadcast.
GSFPS-1936	ANT (CCR-01430)		The GS <b>shall</b> generate uplink stream for Unique Payload Services.
GSFPS-1937			<b>6.22.1 Uplink Radio Frequency Monitoring</b>
GSFPS-1938	ANT (CCR-01430)		The GS <b>shall</b> remotely monitor and display the individual RF/IF satellite uplink carriers immediately before the combining process.
GSFPS-1939	ANT (CCR-01430)		The GS <b>shall</b> remotely monitor and display the composite RF/IF satellite uplink signal after the final stage of amplification.
GSFPS-1940	ANT (CCR-01430)		The GS <b>shall</b> monitor all uplink paths simultaneously.
GSFPS-1944			<b>6.22.2 Downlink Radio Frequency Monitoring</b>
GSFPS-1945	ANT (CCR-01430)		The GS <b>shall</b> remotely monitor and display all RF/IF satellite downlinks.
GSFPS-1946	ANT (CCR-01430)		The GS <b>shall</b> remotely monitor downlinks from a point at the IF switch.
GSFPS-1949	ANT (CCR-01430)		The GS <b>shall</b> receive the GRB signal from the Space Segment as specified in the Space Segment (SS) to GOES Rebroadcast (GRB) Service Interface Requirements Document (IRD) (P 417-R-IRD-0002). (CCR01286)
GSFPS-1951	ANT (CCR-01430)		The GS <b>shall</b> monitor the GRB downlink performance for link quality including the received signal power and the bit error rate.
GSFPS-1956	ANT (CCR-01430)		The GS <b>shall</b> monitor the HRIT/EMWIN downlink performance for link quality including the received signal power and the bit error rate. (CCR-01457)
GSFPS-1968			<b>6.23 Telemetry Downlink Receive</b>
GSFPS-2505	GS Ktr	Base	The GS <b>shall</b> receive engineering telemetry from the satellite in the form of CCSDS Transfer Frames.
GSFPS-2506	GS Ktr	Base	The GS <b>shall</b> verify that received engineering telemetry Transfer Frames are uncorrupted.
GSFPS-2507	GS Ktr	Base	The GS <b>shall</b> flag engineering telemetry Transfer Frames determined to be corrupted.
GSFPS-2508	GS Ktr	Base	The GS <b>shall</b> pre-process engineering telemetry at a rate to keep pace with the receipt of Transfer Frames over the space to ground link.
GSFPS-2509	GS Ktr	Base	The GS <b>shall</b> record the quality and quantity of the engineering telemetry processed through the pre-processing function, including synchronization performance, CCSDS Transfer Frame processing status, and error correction performance.
GSFPS-2510	GS Ktr	Base	The GS <b>shall</b> store for the life of the mission the quality and quantity of the engineering telemetry processed through the pre-processing function, including synchronization performance, CCSDS Transfer Frame processing status, and error correction performance in a daily preprocessing performance log file.
GSFPS-3109	GS Ktr	Base	The GS <b>shall</b> allow the operator to retrieve, display, export and print all stored performance logs.

ID	Dev. Effort	Option	Requirement
GSFPS-2511	GS Ktr	Base	The GS <b>shall</b> monitor the ingest of the engineering telemetry data transfer frames to include the number of Transfer Frames received in a 5 minute period, number of fill packets, and number of Transfer Frames determined to be corrupted.
GSFPS-2512	GS Ktr	Base	The GS <b>shall</b> store all received CCSDS engineering telemetry Transfer Frames in a 5-day revolving temporary storage to support anomaly resolution.
GSFPS-2513	GS Ktr	Base	The GS <b>shall</b> make engineering telemetry pre-processing status information available to EM.
GSFPS-1970	GS Ktr	Base	The GS <b>shall</b> receive and pre-process telemetry from the satellite.
GSFPS-1972	GS Ktr	Base	The GS <b>shall</b> quality-check telemetry according to error detection decoding.
GSFPS-2514	GS Ktr	Base	The GS <b>shall</b> sort housekeeping data by application ID and by virtual channel.
GSFPS-1974	GS Ktr	Base	The GS <b>shall</b> flag telemetry errors.
GSFPS-3057			<b>6.23.1 Telemetry Monitoring</b>
GSFPS-3058	GS Ktr	Base	The GS <b>shall</b> implement a ground programmable telemetry monitoring function (TMON) compliant with GOES-R Spacecraft Functional and Performance Specification (P 417-R-PSPEC-0014).
GSFPS-3059	GS Ktr	Base	The GS <b>shall</b> apply corrective actions through the TMON function based on rules stored in the spacecraft flight computer's memory.
GSFPS-3060	GS Ktr	Base	The GS <b>shall</b> monitor and take action on at least 2048 telemetry points through the TMON function.
GSFPS-3061	GS Ktr	Base	The GS <b>shall</b> flag red limits through the TMON function based on action rules and red limits contained in a table residing in the flight computer's memory.
GSFPS-1976			<b>6.24 Raw Instrument Data Pre-processing</b>
GSFPS-1978	GS Ktr	Base	The GS <b>shall</b> receive raw instrument data from the satellite in the form of CCSDS Transfer Frames.
GSFPS-2521	GS Ktr	Base	The GS <b>shall</b> store all received CCSDS raw instrument data Transfer Frames in a 5-day revolving temporary storage to support anomaly resolution.
GSFPS-1980	GS Ktr	Base	The GS <b>shall</b> verify that received raw instrument data Transfer Frames are uncorrupted.
GSFPS-2515	GS Ktr	Base	The GS <b>shall</b> flag raw instrument data Transfer Frames determined to be corrupted.
GSFPS-2516	GS Ktr	Base	The GS <b>shall</b> pre-process raw instrument data at a rate to keep pace with the receipt of Transfer Frames over the space to ground link consistent with the Space Segment (SS) to Ground Located - Command, Control, and Communications Segment (GL-C3S) (P 417-R-IRD-0001) IRD.
GSFPS-1982	GS Ktr	Base	The GS <b>shall</b> monitor, by virtual channel, the quality and quantity of raw instrument data processed through the pre-processing function.

ID	Dev. Effort	Option	Requirement
GSFPS-2517	GS Ktr	Base	The GS <b>shall</b> capture the quality and quantity measures of the raw instrument data processed through the pre-processing function, including synchronization performance, CCSDS Transfer Frame processing status, and error correction performance.
GSFPS-2518	GS Ktr	Base	The GS <b>shall</b> store the quality and quantity measures of the raw instrument data processed through the pre-processing function, including synchronization performance, CCSDS Transfer Frame processing status, and error correction performance in a daily preprocessing performance log file.
GSFPS-1984	GS Ktr	Base	The GS <b>shall</b> monitor the status of the pre-processing function.
GSFPS-2522	GS Ktr	Base	The GS <b>shall</b> make instrument data pre-processing status information available to EM.
GSFPS-1988	GS Ktr	Base	The GS <b>shall</b> include mission operations data including spacecraft and instrument configuration, instrument observation data status, and ephemerides in preprocessing metadata.
GSFPS-3062	GS Ktr	Base	The GS <b>shall</b> store preprocessing metadata in the 5-day revolving temporary storage system.
GSFPS-1992			<b>6.24.1 Ranging Services</b>
GSFPS-1994	GS Ktr	Base	The GS <b>shall</b> perform ranging through an RF link to the satellite to an accuracy of 50ns.
GSFPS-2523	ANT (CCR-01430)		The GS <b>shall</b> implement the ranging functionality in accordance with the Space Segment (SS) to Ground Located - Command, Control, and Communications Segment (GL-C3S) IRD (417-R-IRD-0001).
GSFPS-1996	ANT (CCR-01430)		The GS <b>shall</b> transmit a ranging signal.
GSFPS-1998	ANT (CCR-01430)		The GS <b>shall</b> receive a ranging signal.
GSFPS-2000	GS Ktr	Base	The GS <b>shall</b> provide range measurements to the orbit determination function.
GSFPS-3063	GS Ktr	Base	The GS <b>shall</b> perform ranging through the GRB link.
GSFPS-3064	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> perform ground loop calibration for each antenna system utilized for GRB ranging.
GSFPS-3065	GS Ktr, ANT (CCR-01430)	Base	The GS <b>shall</b> perform ground loop calibration for each antenna system for purposes of ORT&TC ranging.
GSFPS-2002			<b>6.24.2 Space-Ground Communications Performance</b>
GSFPS-2678	GS Ktr	Base	The GS <b>shall</b> process a minimum of eight physical command configurations for each satellite.
GSFPS-2008	GS Ktr	Base	The GS <b>shall</b> process up to eight physical telemetry stream configurations for each satellite.
GSFPS-2013			<b>6.25 Spacecraft Navigation</b>
GSFPS-2017	GS Ktr	Base	The GS <b>shall</b> perform spacecraft attitude determination consistent with the error tolerances defined in the GIRD.
GSFPS-2019	GS Ktr	Base	The GS <b>shall</b> monitor spacecraft attitude determination and control data.

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.



ID	Dev. Effort	Option	Requirement
GSFPS-2021	GS Ktr	Base	The GS <b>shall</b> verify the performance of the spacecraft attitude control system and the accuracy of the onboard attitude estimate.
GSFPS-2023	GS Ktr	Base	The GS <b>shall</b> plan and execute satellite attitude maneuvers.
GSFPS-2025	GS Ktr	Base	The GS <b>shall</b> perform post-launch satellite sensor and actuator alignment determination.
GSFPS-2027	GS Ktr	Base	The GS <b>shall</b> perform determination of attitude sensor biases and sensor calibration parameters.
GSFPS-2029	GS Ktr	Base	The GS <b>shall</b> perform determination of attitude actuator performance parameters.
GSFPS-2031	GS Ktr	Base	The GS <b>shall</b> perform attitude control system calibration.
GSFPS-2033			<b>6.26 Orbit Determination</b>
GSFPS-2035	GS Ktr	Base	The GS <b>shall</b> acquire two-line orbital elements to support launch and orbit raising activities.
GSFPS-2037	GS Ktr	Base	The GS <b>shall</b> acquire and process measurement data for orbit determination, including raw range measurements, spacecraft instrument observations and engineering telemetry.
GSFPS-2039	GS Ktr	Base	The GS <b>shall</b> plan orbit station management activities and station relocation maneuvers.
GSFPS-2041	GS Ktr	Base	The GS <b>shall</b> plan and execute satellite orbit maintenance activities.
GSFPS-2043	GS Ktr	Base	The GS <b>shall</b> plan and execute orbit relocation activities to change the orbit of a satellite.
GSFPS-2045	GS Ktr	Base	The GS <b>shall</b> plan post-operational mission orbit raising disposal activities.
GSFPS-2047	GS Ktr	Base	The GS <b>shall</b> execute post-operational mission orbit raising disposal activities.
GSFPS-2049	GS Ktr	Base	The GS <b>shall</b> determine the orbit of each satellite during each mission phase from transfer orbit injection by the launch vehicle through verification of the final post-mission orbit-raising maneuver.
GSFPS-3066	GS Ktr	Base	The GS <b>shall</b> plan orbital maneuvers and maneuver sequences such that maneuver plans may be reviewed 12 months in advance.
GSFPS-3067	GS Ktr	Base	The GS <b>shall</b> model orbital maneuvers with an absolute accuracy of 5% deviation relative to the predicted and actual post-maneuver delta-V.
GSFPS-3068	GS Ktr	Base	The GS <b>shall</b> determine spacecraft orbit within 120 meters.
GSFPS-3069	GS Ktr	Base	The GS <b>shall</b> quantify the performance of the GS orbit determination estimate relative to the onboard orbit estimate.
GSFPS-3070	GS Ktr	Base	The GS <b>shall</b> perform spacecraft thruster calibration for the purpose of maneuver planning and propellant management.
GSFPS-2051			<b>6.27 Level 0 Processing</b>
GSFPS-2055	GS Ktr	Base	The GS <b>shall</b> ingest pre-processed instrument observation data.



ID	Dev. Effort	Option	Requirement
GSFPS-2057	GS Ktr	Base	The GS <b>shall</b> process pre-processed instrument observation data by virtual channel.
GSFPS-2066	GS Ktr	Base	The GS <b>shall</b> create L0 data.
GSFPS-2070	GS Ktr	Base	The GS <b>shall</b> monitor and report effective data compression yields.
GSFPS-3110	GS Ktr	Base	The GS <b>shall</b> allow the operator to retrieve, display, and export reports of effective compression yields.
GSFPS-2525	GS Ktr	Base	The GS <b>shall</b> extract Instrument Calibration Data from the L0 data set (for 7-day storage and GS mission-life storage).
GSFPS-2080	GS Ktr	Base	The GS <b>shall</b> create L0 product metadata that includes an accounting of uncorrectable errors in the data.
GSFPS-2082	GS Ktr	Base	The GS <b>shall</b> make L0 product metadata available for downstream processing.
GSFPS-2090			<b>6.28 Mission Management Storage</b>
GSFPS-2094	GS Ktr	Base	The GS <b>shall</b> store each copy of the satellite flight software (spacecraft and instrument) for the life of the mission.
GSFPS-3112	GS Ktr	Base	The GS <b>shall</b> have the capability to retrieve, display, export, and store for the life of the mission operator-selected data from the 5-day revolving temporary storage.
GSFPS-2096	GS Ktr	Base	The GS <b>shall</b> have the capability to retrieve 5-day revolving temporary storage data by selected time periods.
GSFPS-2769	GS Ktr	Base	The GS <b>shall</b> be capable of replaying transfer frames from the 5-day revolving temporary storage back as a separate virtual satellite flow.
GSFPS-2098	GS Ktr	Base	The GS <b>shall</b> allow copying selected data from the 5-day revolving temporary storage to removable media.
GSFPS-2103	GS Ktr	Base	The GS <b>shall</b> capture and store Transfer Frames in the 5-day revolving temporary storage.
GSFPS-2826			<b>6.28.1 Raw Data Recorder</b>
GSFPS-2873	GS Ktr	Base	The GS <b>shall</b> provide a standalone recorder for site specific data capture of instrument and spacecraft data streams.
GSFPS-2874	GS Ktr	Base	The recorder <b>shall</b> accept the baseband data signal from the spacecraft and instruments.
GSFPS-2875	GS Ktr	Base	The recorder <b>shall</b> be able to simultaneously record individual satellite telemetry and instrument data streams.
GSFPS-2876	GS Ktr	Base	The GS <b>shall</b> provide a standalone recorder for site specific data playback of instrument and spacecraft data streams.
GSFPS-2877	GS Ktr	Base	The input of the recorder <b>shall</b> be compliant with the applicable data stream ICD.
GSFPS-2878	GS Ktr	Base	The output of the recorder <b>shall</b> be compliant with the applicable data stream ICD.
GSFPS-2879	GS Ktr	Base	The recorder <b>shall</b> be portable/transportable.

ID	Dev. Effort	Option	Requirement
GSFPS-2880	GS Ktr	Base	The recorder <b>shall</b> have removable commercial off-the-shelf media and drive units.
GSFPS-2881	GS Ktr	Base	The recorder media <b>shall</b> be compatible, interchangeable, and easily movable between multiple instances of the recorder.
GSFPS-2882	GS Ktr	Base	The recorder <b>shall</b> , at operator direction, export/replicate designated data sets on compatible media.
GSFPS-2883	GS Ktr	Base	The recorder <b>shall</b> capture all bits received, including data containing bit errors.
GSFPS-2884	GS Ktr	Base	The recorder <b>shall</b> playback all the bits received, replicating the stream and including reproducing data which includes bit errors.
GSFPS-2885	GS Ktr	Base	The recorder <b>shall</b> output at baseband.
GSFPS-2886	GS Ktr	Base	The recorder <b>shall</b> be configurable to record for an operator specified interval(s) totaling at least 72 hours over the period of a week.
GSFPS-2887	GS Ktr	Base	The recorder <b>shall</b> be configurable to playback for an operator specified interval(s) totaling at least 72 hours over the period of a week.
GSFPS-2888	GS Ktr	Base	The recorder <b>shall</b> record data for 72 continuous hours when so configured by the operator with no breaks in the captured data stream.
GSFPS-2889	GS Ktr	Base	The recorder <b>shall</b> playback data for 72 continuous hours when so configured by the operator with no breaks in the playback output.
GSFPS-2890	GS Ktr	Base	The recorder <b>shall</b> time-stamp the data as it is recorded to a one second resolution.
GSFPS-2891	GS Ktr	Base	During replay the recorder <b>shall</b> make available the timestamps of the data to a one second resolution.
GSFPS-2892	GS Ktr	Base	The recorder <b>shall</b> , at operator direction, synchronize its time clock to the GS reference source.
GSFPS-2893	GS Ktr	Base	The recorder <b>shall</b> have operator selectable "off-line" mode (e.g., for operator interactive activities of set-up and configuration, or for selection of a pre-defined set-up/configuration).
GSFPS-2894	GS Ktr	Base	The recorder <b>shall</b> accept operator configurable starting point (e.g., time of day, time of year) and data stream(s) for both recording and playback.
GSFPS-2895	GS Ktr	Base	The recorder <b>shall</b> save operator defined set-ups and configurations, as designated by the operator, for future use by the operator.
GSFPS-2896	GS Ktr	Base	The recorder <b>shall</b> include a user interface, which can be used to fully control all record and playback operations from computers networked to the recorder.
GSFPS-2898	GS Ktr	Base	The recorder <b>shall</b> display its status to the operator, including real-time, record-time/playback-time, and configuration.
GSFPS-2899	GS Ktr	Base	The recorder <b>shall</b> uniquely identify each volume of media on which it records data.
GSFPS-2900	GS Ktr	Base	The recorder <b>shall</b> maintain a directory of the media identifier and the contents of each recorded volume of data.
GSFPS-2901	GS Ktr	Base	The recorder <b>shall</b> append the medium identifier and the directory of contents of each recorded volume of data, as part of the information on each item of media.

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

ID	Dev. Effort	Option	Requirement
GSFPS-2902	GS Ktr	Base	The recorder <b>shall</b> read the medium identifier and the content directory of all media loaded on it.
GSFPS-2903	GS Ktr	Base	The recorder <b>shall</b> display the medium identifier and the directory of contents of media known to it.
GSFPS-2904	GS Ktr	Base	The recorder <b>shall</b> be configurable by the operator to accept external electronic triggers to start/stop recording.
GSFPS-2527			<b>6.29 Calibration Scheduling</b>
GSFPS-2528	GS Ktr	Base	The GS <b>shall</b> permit automated planning and scheduling of routine radiometric calibration activities for ABI, using defined ABI modes.
GSFPS-2529	GS Ktr	Base	The GS <b>shall</b> permit automated planning and scheduling of special radiometric calibration activities for ABI, using defined ABI modes.
GSFPS-2530	GS Ktr	Base	The GS <b>shall</b> permit automated planning and scheduling of ABI lunar and stellar observations to allow long-term calibration drift measurement and correction.
GSFPS-2531	GS Ktr	Base	The GS <b>shall</b> permit automated planning and scheduling of routine instrument calibration activities for GLM, using defined GLM modes.
GSFPS-2532	GS Ktr	Base	The GS <b>shall</b> permit automated planning and scheduling of routine radiometric calibration activities for Solar Ultraviolet Imager (SUVI), using defined SUVI modes.
GSFPS-2533	GS Ktr	Base	The GS <b>shall</b> permit automated planning and scheduling of long-term radiometric performance monitoring activities for SUVI, employing routine electronic calibration measurements, internal sources, and the sun, and using defined SUVI modes.
GSFPS-2534	GS Ktr	Base	The GS <b>shall</b> permit automated planning and scheduling of routine radiometric calibration activities for Extreme ultraviolet and X-ray Irradiance Sensor (EXIS), using defined EXIS modes.
GSFPS-2535	GS Ktr	Base	The GS <b>shall</b> permit automated planning and scheduling of long-term radiometric performance monitoring activities for EXIS, employing routine electronic calibration measurements, internal sources, and the sun, and using defined EXIS modes.
GSFPS-2536	GS Ktr	Base	The GS <b>shall</b> permit automated planning and scheduling of long-term performance trending for Space Environment In Situ Suite (SEISS), from routine electronic calibration using defined SEISS modes.
GSFPS-2537	GS Ktr	Base	The GS <b>shall</b> permit automated planning and scheduling of long-term performance trending for SEISS using defined SEISS modes.
GSFPS-2106			<b>7 PRODUCT GENERATION REQUIREMENTS</b>
GSFPS-2538			<b>7.1 Overview</b>
GSFPS-2539			Section 7 specifies the Product Generation (PG) function of the GOES-R Series GS.

ID	Dev. Effort	Option	Requirement
GSFPS-2108			<b>7.2 Operational View</b>
GSFPS-2110			The PG function includes the generation of L1b and L2+ products from each GOES-R Series operational satellite on a continuous basis, meeting the applicable product latency requirements. Using the L1b and some L2+ output, the PG function also will create the GRB data set for rebroadcast by the GOES-R satellites and the eGVAR data set for rebroadcast by the GOES-N/O/P Ground System.
GSFPS-2132			<b>7.3 Product Generation</b>
GSFPS-2136	GS Ktr	Base	The GS <b>shall</b> produce all End-Products identified in GS Product Sets 1 and 2 in accordance with Appendix A, Table 1 using the Government-supplied algorithms.
GSFPS-2953	GS Ktr	0001	The GS <b>shall</b> produce all End-Products identified in GS Product Sets 1 and 2 in accordance with Appendix D using the Government-supplied algorithms.
GSFPS-2540	GS Ktr	0002	The GS <b>shall</b> process all End-Product sets identified in GS Product Set 3 as listed in Appendix A, Table 3 using the Government-supplied algorithms.
GSFPS-2541	GS Ktr	0002	The GS <b>shall</b> produce all End-Product sets identified in GS Product Set 4 in accordance with Appendix A, Table 3 using the Government-supplied algorithms.
GSFPS-3149			The GS will produce products in NetCDF (currently version 4) and McIDAS for Atmosphere, Land, and Ocean Products, and NetCDF (currently version 4) and FITS for Space Products.
GSFPS-3156	AWG		The L2+ algorithms <b>shall</b> yield Atmospheric, Ocean, and Land End-Products listed in the associated product table, preserving the Geographic Coverage Areas of the data provided by the instruments, subject to the Product Qualifiers Table in Appendix A.
GSFPS-2152	AWG		The L2+ algorithms <b>shall</b> yield Atmospheric, Ocean, and Land End-Products meeting the following End-Product Performance Parameters as listed in the associated product table and subject to the Product Qualifiers Table in Appendix A: a) Product Vertical Resolution b) Product Horizontal Resolution at nadir c) Product Mapping Accuracy at nadir d) Product Measurement Range e) Product Measurement Accuracy f) Product Measurement Precision

ID	Dev. Effort	Option	Requirement
GSFPS-3100			<p>The Government will provide L1b algorithms that define the method of processing instrument sensor data used to generate Atmospheric, Ocean, and Land End-Products meeting the following End-Product Performance Parameters as listed in the associated product table and subject to the Product Qualifiers Table in Appendix A:</p> <ul style="list-style-type: none"> <li>a) Geographic Coverage Area</li> <li>b) Product Vertical Resolution</li> <li>c) Product Horizontal Resolution at nadir</li> <li>d) Product Mapping Accuracy at nadir</li> <li>e) Product Measurement Range</li> <li>f) Product Measurement Accuracy</li> <li>g) Product Measurement Precision</li> </ul>
GSFPS-3194			<p>The Government will provide algorithms that define the method of processing L1b data to generate L2+ Atmospheric, Ocean, and Land End-Products that meet the following End-Product Performance Parameters as listed in the associated product table, subject to the Product Qualifiers Table in Appendix A:</p> <ul style="list-style-type: none"> <li>a) Geographic Coverage Area</li> <li>b) Product Vertical Resolution</li> <li>c) Product Horizontal Resolution at nadir</li> <li>d) Product Mapping Accuracy at nadir</li> <li>e) Product Measurement Range</li> <li>f) Product Measurement Accuracy</li> <li>g) Product Measurement Precision</li> </ul>
GSFPS-3182			<p>The Government will provide L2+ algorithms that define the method of processing instrument sensor data used to generate Atmospheric, Ocean, and Land End-Products for Lightning Detection that meet the following End-Product Performance Parameters as listed in the associated product table and subject to the Product Qualifiers Table in Appendix A:</p> <ul style="list-style-type: none"> <li>a) Geographic Coverage Area</li> <li>b) Product Vertical Resolution</li> <li>c) Product Horizontal Resolution at nadir</li> <li>d) Product Mapping Accuracy at nadir</li> <li>e) Product Measurement Range</li> <li>f) Product Measurement Accuracy</li> <li>g) Product Measurement Precision</li> </ul>
GSFPS-2164			<p>The Government will provide L1b algorithms that define the method of processing instrument sensor data used to generate Space Weather End-Products meeting the following End-Product Performance Parameters as listed in the associated product table and subject to the Product Qualifiers Table in Appendix A:</p> <ul style="list-style-type: none"> <li>a) Product Orthogonality / Coverage Areas</li> <li>b) Product Horizontal/Angular Resolution</li> <li>c) Product Pointing/Mapping Uncertainty</li> <li>d) Product Measurement Range</li> <li>e) Product Measurement Accuracy</li> <li>f) Product Measurement Precision</li> </ul>

ID	Dev. Effort	Option	Requirement
GSFPS-2150	GS Ktr	Base	The GS <b>shall</b> generate the L1b Atmospheric, Ocean, and Land End-Products listed in the associated product table, using the government supplied algorithms, preserving the Geographic Coverage Areas of the data provided by the instrument, subject to the Product Qualifiers Table in Appendix A.
GSFPS-3171	GS Ktr	Base	The GS <b>shall</b> generate L1b Atmospheric, Ocean, and Land End-Products preserving the following End-Product Performance Parameters produced by the government-provided algorithm as listed in the associated product table and subject to the Product Qualifiers Table in Appendix A:  a) Product Vertical Resolution b) Product Horizontal Resolution at nadir c) Product Mapping Accuracy at nadir d) Product Measurement Range e) Product Measurement Accuracy f) Product Measurement Precision
GSFPS-2776	GS Ktr	Base	The GS <b>shall</b> generate L1b Atmospheric, Ocean, and Land End-Products meeting the Product Refresh / Coverage Time for each non-diagnostic instrument mode using the government-supplied algorithms listed in Table 1 Appendix A, subject to the Product Qualifiers Table in Appendix A.
GSFPS-2777	GS Ktr	0001	The GS <b>shall</b> generate L1b Atmospheric, Ocean, and Land End-Products meeting the Product Refresh / Coverage Time for each non-diagnostic instrument mode using the government-supplied algorithms listed in Appendix D, subject to the Product Qualifiers Table in Appendix A. (CCR01288)
GSFPS-3183	GS Ktr	Base	The GS <b>shall</b> generate L1b Atmospheric, Ocean, and Land End-Products meeting the Vendor Allocated Ground Latency (VAGL) for each non-diagnostic instrument mode using the government-supplied algorithms listed in Table 1 Appendix A, subject to the Product Qualifiers Table in Appendix A.
GSFPS-3184	GS Ktr	0001	The GS <b>shall</b> generate L1b Atmospheric, Ocean, and Land End-Products meeting the VAGL for each non-diagnostic instrument mode using the government-supplied algorithms listed in Table 1 Appendix D, subject to the Product Qualifiers Table in Appendix A.
GSFPS-3169	GS Ktr	Base	The GS <b>shall</b> generate L1b Space Weather End-Products listed in the associated product table, preserving the Product Orthogonality/ Coverage of the data provided by the instrument, subject to the Product Qualifiers Table in Appendix A.
GSFPS-3174	GS Ktr	Base	The GS <b>shall</b> generate L1b Space Weather End-Products preserving the following End-Product Performance Parameters produced by the government-provided algorithm as listed in the associated product table and subject to the Product Qualifiers Table in Appendix A:  a) Product Horizontal/Angular Resolution b) Product Pointing/ Mapping Accuracy c) Product Pointing Knowledge / Mapping Uncertainty d) Product Measurement Range e) Product Measurement Accuracy f) Product Measurement Precision



ID	Dev. Effort	Option	Requirement
GSFPS-3186	GS Ktr	Base	The GS <b>shall</b> generate L1b Space Weather End-Products meeting the Product Refresh / Coverage Time for each non-diagnostic instrument mode using the government-supplied algorithms listed in Table 1 Appendix A, subject to the Product Qualifiers Table in Appendix A.
GSFPS-3187	GS Ktr	Base	The GS <b>shall</b> generate L1b Space Weather End-Products meeting the VAGL for each non-diagnostic instrument mode using the government-supplied algorithms listed in Table 1 Appendix A, subject to the Product Qualifiers Table in Appendix A.
GSFPS-2721	GS Ktr	Base	The GS <b>shall</b> generate L2+ Atmospheric, Ocean, and Land End-Products preserving the following End-Product Performance Parameters produced by the government-provided algorithm as listed in the associated product table and subject to the Product Qualifiers Table in Appendix A: a) Geographic Coverage Areas b) Product Vertical Resolution c) Product Horizontal Resolution at nadir d) Product Mapping Accuracy at nadir e) Product Measurement Range f) Product Measurement Accuracy g) Product Measurement Precision
GSFPS-3188	GS Ktr	Base	The GS <b>shall</b> generate L2+ Atmospheric, Ocean, and Land End-Products meeting the Product Refresh / Coverage Time for each non-diagnostic instrument mode using the government-supplied algorithms listed in Table 1 Appendix A, subject to the Product Qualifiers Table in Appendix A.
GSFPS-3189	GS Ktr	0001	The GS <b>shall</b> generate L2+ Atmospheric, Ocean, and Land End-Products meeting the Product Refresh / Coverage Time for each non-diagnostic instrument mode using the government-supplied algorithms listed in Table 1 Appendix D, subject to the Product Qualifiers Table in Appendix A.
GSFPS-3190	GS Ktr	0002	The GS <b>shall</b> generate L2+ Atmospheric, Ocean, and Land End-Products meeting the Product Refresh / Coverage Time for each non-diagnostic instrument mode using the government-supplied algorithms listed in Table 3 Appendix A, subject to the Product Qualifiers Table in Appendix A.
GSFPS-3191	GS Ktr	Base	The GS <b>shall</b> generate L2+ Atmospheric, Ocean, and Land End-Products meeting the VAGL for each non-diagnostic instrument mode using the government-supplied algorithms listed in Table 1 Appendix A, subject to the Product Qualifiers Table in Appendix A.
GSFPS-3192	GS Ktr	0001	The GS <b>shall</b> generate L2+ Atmospheric, Ocean, and Land End-Products meeting the VAGL for each non-diagnostic instrument mode using the government-supplied algorithms listed in Table 1 Appendix D, subject to the Product Qualifiers Table in Appendix A.
GSFPS-3193	GS Ktr	0002	The GS <b>shall</b> generate L2+ Atmospheric, Ocean, and Land End-Products meeting the VAGL for each non-diagnostic instrument mode using the government-supplied algorithms listed in Table 3 Appendix A, subject to the Product Qualifiers Table in Appendix A.
GSFPS-2758	GS Ktr	Base	The GS <b>shall</b> generate End-Products based on the Government-provided Algorithm Packages such that the comparison of GS test data outputs and AWG test data outputs yields reproducibility based on squared correlation coefficient (r-squared) between these two of at least 0.9995 with no more than 1% of the compared values having error greater than 0.15% from the AWG-provided value for the given data point.



ID	Dev. Effort	Option	Requirement
GSFPS-3129	GS Ktr	Base	The GS <b>shall</b> refresh sectorized products in accordance with Appendix E.
GSFPS-2148	GS Ktr	Base	The GS <b>shall</b> monitor and report all end-product performance parameter compliance.
GSFPS-2542	GS Ktr	Base	The GS <b>shall</b> store end-product performance parameters for the life of the mission.
GSFPS-2543	GS Ktr	Base	The GS <b>shall</b> forward the end-product performance parameters report to EM.
GSFPS-1434	GS Ktr	Base	The GS <b>shall</b> collect and report to EM performance measures at a level of detail sufficient to assess the margin on a per-process and per-product basis for product latency and refresh.
GSFPS-2180	GS Ktr	Base	The GS <b>shall</b> monitor and report all end-product performance parameters listed in the Appendix A end-product Table.
GSFPS-2205			The KPPs consist of: cloud and moisture imagery: CONUS, Full Disk, and Mesoscale, and sectorized products. The performance and quality constraints for CONUS, Full Disk, and Mesoscale KPP end-products are defined in Appendices A through D. The GS performance requirements with respect to sectorized products are defined in Appendix E.
GSFPS-2215			<b>7.4 Metadata Generation</b>
GSFPS-3168			The GS Data Management Plan [G417-R-PLN-0131] provides guidelines for GOES-R metadata.
GSFPS-2217	GS Ktr	Base	The GS <b>shall</b> generate metadata describing completeness of input, identifying content outliers, and documenting the UTC time of completion of production for each L1b and L2+ data product.
GSFPS-2928	GS Ktr	Base	The GS <b>shall</b> generate metadata that provides sufficient information at all levels of data granularity to be able to identify, evaluate, extract, employ and manage the data and data products from GOES-R.
GSFPS-2219	GS Ktr	Base	The GS <b>shall</b> generate metadata that contains all mandatory attributes and relevant optional attributes of the ISO 19115 - Metadata standard.
GSFPS-2929	GS Ktr	Base	The GS <b>shall</b> generate metadata that is compliant with ISO 19115-2 - Geographic Information - Metadata - Part 2: Extensions for imagery and gridded data.
GSFPS-3073	GS Ktr	Base	The GS <b>shall</b> generate metadata that is compliant with ISO/TR 19121 - Geographic Information - Imagery and Gridded Data.
GSFPS-2793	GS Ktr	Base	The GS <b>shall</b> generate metadata compliant with FGDC standards.
GSFPS-2794	GS Ktr	Base	The GS <b>shall</b> generate metadata that is compliant with ISO 19130 - Sensor and data model for imagery and gridded data (includes SensorML).
GSFPS-2930	GS Ktr	Base	The GS <b>shall</b> generate metadata that is compliant with ISO 19136 - Geography Markup Language (GML).
GSFPS-2931	GS Ktr	Base	The GS <b>shall</b> generate metadata that is compliant with ISO 19138 - Data quality measures.
GSFPS-2932	GS Ktr	Base	The GS <b>shall</b> generate metadata that is compliant with ISO 19139 - Metadata - XML Schema Implementation.

ID	Dev. Effort	Option	Requirement
GSFPS-3074	GS Ktr	Base	The GS <b>shall</b> generate metadata that is compliant with ISO 6709 Standard representation of latitude, longitude and altitude for geographic point locations.
GSFPS-3196	GS Ktr	Base	The GS <b>shall</b> generate metadata that is compliant with ISO 19109 - Geographic information -- Rules for Application Schema. (CCR01285)
GSFPS-3195	GS Ktr	Base	The GS <b>shall</b> generate metadata that is compliant with ISO 19113 - Geographic information -- Quality principles. (CCR01285)
GSFPS-3197	GS Ktr	Base	The GS <b>shall</b> generate metadata that is compliant with ISO 19114 - Geographic information -- Quality evaluation procedures. (CCR01285)
GSFPS-2933	GS Ktr	Base	The GS <b>shall</b> generate metadata that includes metadata attributes that are generated by current legacy GOES products.
GSFPS-2934	GS Ktr	Base	The GS <b>shall</b> generate metadata that supports anomaly recognition.
GSFPS-2935	GS Ktr	Base	The GS <b>shall</b> generate metadata that supports operational quality assessment.
GSFPS-2936	GS Ktr	Base	The GS <b>shall</b> generate metadata that supports operational applications and decision support systems.
GSFPS-2937	GS Ktr	Base	The GS <b>shall</b> generate metadata that supports scientific use including information that is necessary for discipline area and interdisciplinary studies.
GSFPS-2938	GS Ktr	Base	The GS <b>shall</b> generate metadata that supports long term preservation, including information necessary to identify the data in the long-term future and to sufficiently characterize that data so that it can be used in climatological science to construct a climate record.
GSFPS-2939	GS Ktr	Base	The GS <b>shall</b> generate metadata using a model that is extensible.
GSFPS-2795	GS Ktr	Base	The GS <b>shall</b> generate metadata files that include data provenance.
GSFPS-2940	GS Ktr	Base	The GS <b>shall</b> generate metadata needed for archival and stewardship.
GSFPS-2941	GS Ktr	Base	The GS <b>shall</b> generate metadata required for data reprocessing.
GSFPS-2942	GS Ktr	Base	The GS <b>shall</b> generate metadata required for real-time processing and use by NWS.
GSFPS-2943	GS Ktr	Base	The GS <b>shall</b> generate metadata required for processing and use by OSDPD.
GSFPS-3094	GS Ktr	Base	The GS <b>shall</b> create end-product attribute reports.
GSFPS-2221			<b>7.5 Product Generation Supervision</b>
GSFPS-2223	GS Ktr	Base	The GS <b>shall</b> monitor and report PG status.
GSFPS-2225	GS Ktr	Base	The GS <b>shall</b> notify operators of data and product anomalies.
GSFPS-2229	GS Ktr	Base	The GS <b>shall</b> enable operations analyses of anomalous conditions.
GSFPS-2231	GS Ktr	Base	The GS <b>shall</b> manage anomaly investigation reports in a database for the life of the mission.
GSFPS-2544	GS Ktr	Base	The GS <b>shall</b> capture event messages of PG events.

ID	Dev. Effort	Option	Requirement
GSFPS-2546	GS Ktr	Base	The GS <b>shall</b> selectively filter PG event messages based on operator designation for forwarding to EM.
GSFPS-2547	GS Ktr	Base	The GS <b>shall</b> forward filtered event messages of PG events to EM.
GSFPS-2233			<b>7.6 Generate Level 1 Products</b>
GSFPS-2789	GS Ktr	Base	The GS <b>shall</b> produce L1b products for all non-diagnostic data-producing instrument modes of the satellite in accordance with Appendix A, Table 1.
GSFPS-3101	GS Ktr	0001	The GS <b>shall</b> produce L1b products for all non-diagnostic data-producing instrument modes of the satellite in accordance with Appendix D.
GSFPS-3097	GS Ktr	Base	The GS <b>shall</b> produce GRB products for uplink at the rate at which the instruments produce data on a swath-by-swath basis.
GSFPS-2235	GS Ktr	Base	The GS <b>shall</b> collect L1b product quality metrics to include loss of source data input and number of outlier detections.
GSFPS-2554	GS Ktr	Base	The GS <b>shall</b> append instrument derived calibration and navigation information for those L1b products not resampled to the fixed grid.
GSFPS-2237	GS Ktr	Base	The GS <b>shall</b> assemble GOES-R products and associated metadata nominally produced at WCDAS for GRB uplink in accordance with the following allocation: <ul style="list-style-type: none"> <li>a) LHCP: L1b products from ABI 0.64 um band and 6 IR bands (3.9, 6.185, 7.34, 11.2, 12.3, and 13.3 um)</li> <li>b) RHCP: L1b products from ABI bands 0.47, 0.865, 1.378, 1.61, 2.25, 6.95, 8.5, 9.6 and 10.35 um, L2+ GLM, L1b SUVI, L1b EXIS, and L1b SEISS products as specified in Appendices A-D, and Magnetometer data</li> </ul>
GSFPS-2555	GS Ktr	Base	The GS <b>shall</b> apply lossless compression for GRB.
GSFPS-2556	GS Ktr	Base	The GS <b>shall</b> format all data for transfer over the GRB link using CCSDS 133.0-B-1 Section 4.1 Protocol Data Unit.
GSFPS-2557	GS Ktr	Base	The GS <b>shall</b> constrain the GRB CCSDS Space Packet data zone to not exceed 16,384 octets.
GSFPS-2559	GS Ktr	Base	The GS <b>shall</b> append a CRC integrity measure to each GRB Space Packet.
GSFPS-2680	GS Ktr	Base	The GS <b>shall</b> provide GRB Information Packets each 5 minutes that include, at a minimum: <ul style="list-style-type: none"> <li>a) For ABI: <ul style="list-style-type: none"> <li>1) ABI operations mode</li> <li>2) ABI coverage scheduling</li> </ul> </li> <li>b) For All Instruments: <ul style="list-style-type: none"> <li>1) Instrument Calibration Data necessary for L1b processing</li> <li>2) Messages for other than operational instrument modes</li> <li>3) Events either occurring or planned that impact routine data coverage</li> </ul> </li> </ul>
GSFPS-2681	GS Ktr	Base	The GS <b>shall</b> generate emulated GVAR (eGVAR) data in accordance with the Ground Segment (GS) to GOES N/O/P Ground System Interface Requirements Document (IRD) (P 417-R-IRD-0158).

ID	Dev. Effort	Option	Requirement
GSFPS-3150	GS Ktr	Base	The GS <b>shall</b> generate eGVAR using the following ABI bands: 0.64, 3.9, 6.19, 11.2, and 13.3 um.
GSFPS-3151	GS Ktr	Base	The GS <b>shall</b> generate eGVAR from Full Disk ABI scans every 30 minutes.
GSFPS-2548	GS Ktr	Base	The GS <b>shall</b> generate the L1b products in accordance with Government-supplied algorithms.
GSFPS-2549	GS Ktr	Base	The GS <b>shall</b> report outliers detected such as saturated samples during the ABI resampling process.
GSFPS-2550	GS Ktr	Base	The GS <b>shall</b> store in a separate file in the 7-day revolving temporary storage a record of the sample array used in the ABI resampling to a fixed grid pixel, when outlier(s) are detected.
GSFPS-2354	GS Ktr	Base	The GS <b>shall</b> provide eGVAR data in accordance with the Ground Segment (GS) to GOES N/O/P Ground System Interface Requirements Document (IRD) (P 417-R-IRD-0158).
GSFPS-2926	GS Ktr	Base	The GS <b>shall</b> create L1b product metadata that includes an accounting of uncorrectable errors detected in the raw data link that propagate to L1b, algorithm software version, and instrument serial number.
GSFPS-3075	GS Ktr	Base	The GS <b>shall</b> include L1b product quality metrics in the L1b metadata.
GSFPS-3076	GS Ktr	Base	The GS <b>shall</b> append the L1b metadata to the L1b product.
GSFPS-3077	GS Ktr	Base	The GS <b>shall</b> use a separate APID in the CCSDS Header unique for each data type.
GSFPS-3079	GS Ktr	Base	The GS <b>shall</b> produce L1b products for diagnostic data-producing instrument modes of the satellite in which the data produced by the instruments supports L1b product generation.
GSFPS-3080	GS Ktr	Base	The GS <b>shall</b> identify L1b products generated from diagnostic data-producing instrument modes.
GSFPS-2243			<b>7.7 Instrument Radiometric (including Photometric) and Energetic Particle Calibration</b>
GSFPS-2249	GS Ktr	Base	The GS <b>shall</b> perform instrument radiometric (including photometric) or energetic particle calibration for each instrument using calibration algorithms supplied by the Government and calibration database constants developed by each instrument vendor and provided by the Government.
GSFPS-2251	GS Ktr	Base	The GS <b>shall</b> receive instrument calibration database parameters and database parameter updates from the Government. (CCR01429)
GSFPS-2956	GS Ktr	Base	The GS <b>shall</b> apply the instrument radiometric and energetic particle calibration to the data to produce L1b products.
GSFPS-2563	GS Ktr	Base	The GS <b>shall</b> ingest calibration database parameters. (CCR01429)
GSFPS-2564	GS Ktr	Base	The GS <b>shall</b> implement instrument calibration parameters into GS instrument calibration databases. (CCR01429)
GSFPS-2257	GS Ktr	Base	The GS <b>shall</b> receive pre-launch vendor detector selection tables to be used to baseline the condition of the detector array.

ID	Dev. Effort	Option	Requirement
GSFPS-2259	GS Ktr	Base	The GS <b>shall</b> maintain ABI detector selection tables.
GSFPS-3081	GS Ktr	Base	The GS <b>shall</b> provide for variable ABI bit depth quantities by band as long as radiance precision is maintained in order to conserve GRB bandwidth.
GSFPS-3201	AWG		The GS <b>shall</b> apply radiance drift corrections to compensate for at least 1% radiance drift due to expected ABI instrument degradation (from 1.5% to 0.5% over the lifetime of the instrument). (CCR01396)
GSFPS-3202	GS Ktr	Base	The GS <b>shall</b> have the capability to apply drift corrections, by instrument channel, to compensate for instrument degradation. (CCR01396)
GSFPS-2267			<b>7.8 Generate Level 2+ Products</b>
GSFPS-2565	GS Ktr	Base	The GS <b>shall</b> ingest L1b data as input to L2+ product processing.
GSFPS-2289	GS Ktr	Base	The GS <b>shall</b> capture L2+ product quality measurements of derived content measure that include average, maximum and minimum content values.
GSFPS-2287	GS Ktr	Base	The GS <b>shall</b> create the L2+ products.
GSFPS-2271	GS Ktr	Base	The GS <b>shall</b> receive ancillary data from the ADRS in accordance with the Ground Segment (GS) To Ancillary Data Relay System (ADRS) Interface Requirements Document (IRD) (P 417-R-IRD-0157).
GSFPS-2283	GS Ktr	Base	The GS <b>shall</b> manage product algorithm software, documentation and metadata.
GSFPS-2927	GS Ktr	Base	The GS <b>shall</b> create L2+ product metadata that includes an accounting of uncorrectable errors propagated to L2+ products, L2+ quality metrics, L2+ end-product performance parameter compliance metrics, algorithm software version, ancillary data version(s), and instrument serial number.
GSFPS-3181	GS Ktr	Base	The GS <b>shall</b> append the L2+ metadata to the L2+ product.
GSFPS-2293			<b>7.9 Product Generation Storage</b>
GSFPS-2295	GS Ktr	Base	The GS <b>shall</b> assign a unique file identifier to each product.
GSFPS-2297	GS Ktr	Base	The GS <b>shall</b> create and append an integrity measurement to all products processed through the GS.
GSFPS-2301	GS Ktr	Base	The GS <b>shall</b> store L1b product quality measurements of derived content measure that include average, maximum and minimum content values for the life of the mission.
GSFPS-2818			<b>7.10 GOES Rebroadcast Simulator</b>
GSFPS-2682	GS Ktr	Base	The GS <b>shall</b> provide a standalone simulation of the GRB rebroadcast data stream for local, on-site testing of user ingest and data handling systems.
GSFPS-2796	GS Ktr	Base	The GRB Simulator <b>shall</b> be portable/transportable.
GSFPS-2797	GS Ktr	Base	The output of the GRB Simulator <b>shall</b> be consistent with the GRB output, including physical layer link characteristics specified in the Space Segment to GOES Rebroadcast IRD, 417-R-IRD-0002, and subsequent Space Segment ICDs. (CCR01328)

ID	Dev. Effort	Option	Requirement
GSFPS-2798	GS Ktr	Base	The GRB Simulator <b>shall</b> have user selectable "off-line" mode (e.g., for operator interactive activities of scenario and test pattern creation or modification, configuration definition).
GSFPS-2799	GS Ktr	Base	The GRB Simulator <b>shall</b> have a user selectable "on-line" mode (for output of GRB).
GSFPS-2800	GS Ktr	Base	The GRB Simulator <b>shall</b> output data, without user intervention, over a period of at least 5-days, incrementing all time and header fields in a realistic manner and in accordance with the expectation of the GRB section of the Product Definition and Users' Guide (CDRL SE-16). (CCR01328)
GSFPS-2801	GS Ktr	Base	The GRB Simulator <b>shall</b> output data utilizing user defined scenarios and configurations.
GSFPS-2802	GS Ktr	Base	The GRB Simulator <b>shall</b> provide for user (manual) creation of scenarios, configurations, and test patterns for use by the operator.
GSFPS-2803	GS Ktr	Base	The GRB Simulator <b>shall</b> provide for the input of scenarios, configurations, test patterns, and proxy data from externally created files.
GSFPS-2804	GS Ktr	Base	The GRB Simulator <b>shall</b> store scenarios, configurations, test patterns, and proxy data files for use as directed by the user.
GSFPS-2805	GS Ktr	Base	The GRB Simulator <b>shall</b> accept a user configurable starting point for simulations, e.g. time of day, day of year, and data content.
GSFPS-2806	GS Ktr	Base	The GRB Simulator <b>shall</b> output user modifiable/configurable content based on GRB Scenarios currently being output.
GSFPS-2807	GS Ktr	Base	The GRB Simulator <b>shall</b> create user designated errors (type and frequency) in the output stream when so directed.
GSFPS-2808	GS Ktr	Base	The GRB Simulator <b>shall</b> output GRB at IF.
GSFPS-2809	GS Ktr	Base	The GRB Simulator <b>shall</b> output GRB at baseband.
GSFPS-2810	GS Ktr	Base	The GRB Simulator <b>shall</b> display its status to the user, including real-time, simulation-time, and configuration and test/proxy data in use.
GSFPS-2811	GS Ktr	Base	The GRB Simulator <b>shall</b> require only generally available hand tools for take-down and packing for shipment from a site, and un-packing and set-up on receipt at a site.
GSFPS-2813	GS Ktr	Base	The GRB Simulator <b>shall</b> provide user definition of header and documentation fields at the word level.
GSFPS-2814	GS Ktr	Base	The GRB Simulator <b>shall</b> provide user selectable pattern generation for data fields.
GSFPS-2815	GS Ktr	Base	The GRB Simulator <b>shall</b> provide user selection of stored and imported (externally prepared) files for header, documentation, and data fields.
GSFPS-2816	GS Ktr	Base	The GRB Simulator <b>shall</b> maintain an event log.
GSFPS-2817	GS Ktr	Base	The GRB Simulator <b>shall</b> generate time field values based on "on-line" mode user selection of either a fixed reference time or actual wall-clock time.



ID	Dev. Effort	Option	Requirement
GSFPS-2958			<b>7.11 Operational Instrument Calibration Data Metrics Monitoring</b>
GSFPS-2959	GS Ktr	Base	<p>The GS <b>shall</b> be capable of operational monitoring and display of the operational (current and trended) values for the following Instrument Calibration Data parameters:</p> <ul style="list-style-type: none"> <li>a) ABI Component temperatures <ul style="list-style-type: none"> <li>1) Blackbody</li> <li>2) Mirrors</li> <li>3) Detector (patch)</li> <li>4) Baseplate</li> <li>5) Electronics</li> <li>6) Cooler (or cooler housing)</li> </ul> </li> <li>b) Radiometric Data (Note: 6 and 7 are for ABI calibration drift correction) <ul style="list-style-type: none"> <li>1) Noise (NEDN/NEDT)</li> <li>2) Calibration coefficients (such as intercept and slope)</li> <li>3) Blackbody counts</li> <li>4) Space view counts</li> <li>5) Radiometric PRT counts</li> <li>6) Lunar scans</li> <li>7) Star catalog scans</li> </ul> </li> <li>c) GLM electronic and scene data collected for calibration on command (slew spacecraft to collect non-earth scene)</li> <li>d) SUVI electronic calibration collected on command</li> </ul>
GSFPS-2960	GS Ktr	Base	The GS <b>shall</b> provide the capability to remotely view the current and trended Instrument Calibration Data metrics displays from external algorithm maintenance or calibration / validation facilities.
GSFPS-2326			<b>8 PRODUCT DISTRIBUTION REQUIREMENTS</b>
GSFPS-2328			<b>8.1 Overview</b>
GSFPS-2567			Section 8 specifies the PD element functionality of the GOES-R GS. The PD element provides real-time continuous network distribution of GS products and data. The GOES-R Access Subsystem portion of PD includes revolving temporary 7-day storage of products and data. It also includes the GOES-R Access Point that provides product availability for, and distribution to users. The GOES-R Access Subsystem will be designed, developed, and transitioned by the OSD organization with support from the GSP for GS integration.
GSFPS-2330			Data and information will be provided by the PD functionality in support of authorized GOES-R users.
GSFPS-3152			PD is responsible for any reformatting, reprojection, subsetting (sectorizing), and routing for distribution to the AWIPS interface. AWIPS data is routed to NWS per the GOES-R Series Ground Segment (GS) to Advanced Weather Interactive Processing System (AWIPS) Interface Requirements Document (IRD) (P417-R-IRD-0160).



ID	Dev. Effort	Option	Requirement
GSFPS-2332			The major PD functions are: <ul style="list-style-type: none"> <li>a) Delivery of products and associated supporting data for long-term archive to CLASS</li> <li>b) Delivery of products and mission data to satisfy product subscriptions and one-time delivery of products and mission data to meet latency delivery requirements</li> <li>c) Delivery of sectorized cloud and moisture imagery to AWIPS</li> </ul>
GSFPS-2338			<b>8.2 Product and Data Dissemination</b>
GSFPS-2340	GS Ktr, GAS (CCR-01430)	Base	The GS <b>shall</b> make available all L1b and L2+ products as specified in Appendix A through the GOES-R Access Point.
GSFPS-2949	All (CCR-01414)	0001	The GS <b>shall</b> make available all L1b and L2+ products as specified in Appendix D to the GOES-R Access Subsystem.
GSFPS-2342	GS Ktr, OSO (CCR-01430)	Base	The GS <b>shall</b> send products and data to CLASS for archive in accordance with the Ground Segment (GS) To Comprehensive Large Array-Data Stewardship System (CLASS) Interface Requirements Document (IRD) (417-R-IRD-0090).
GSFPS-2344	GAS (CCR-01430)		The GS <b>shall</b> acknowledge receipt of data requests within ten seconds (10 seconds) (TBR).
GSFPS-2569	GS Ktr	Base	The GS <b>shall</b> provide Instrument Calibration Data to include star looks (instrument CAL, Instrument CAL / drift), blackbody temperatures, mirror temperatures, space look, and lunar observations to the GOES-R Access Subsystem.
GSFPS-3082	GAS (CCR-01430)		The GS <b>shall</b> limit data subscriptions based on operator configurable parameters (e.g., total duration, and single request data volume).
GSFPS-3161	GS Ktr	Base	The GS <b>shall</b> produce CLASS Submission Manifests, in accordance with the Submission Agreements between GOES-R Ground Segment and NGDC/NCDC [CDRL SE-20] that identify all data, information and products to be sent to CLASS for long-term archival storage.
GSFPS-3162	GS Ktr	Base	The GS <b>shall</b> produce CLASS Manifest activity reports, in accordance with the Submission Agreements between GOES-R Ground Segment and NGDC/NCDC [CDRL SE-20], containing a 72-hour data submission summary.
GSFPS-3163	GS Ktr	Base	The GS <b>shall</b> produce CLASS File activity reports, in accordance with the Submission Agreements between GOES-R Ground Segment and NGDC/NCDC [CDRL SE-20], containing a 72-hour summary of files sent to CLASS.
GSFPS-3164			The operator will have the capability to configure which products are to be sent to CLASS, and adjust the archive status of any output product (based on policy decisions). Whenever the GS produces a product, data item, or file identified as "for archive," the GS will make it available for transmission to CLASS in accordance with the GS to CLASS IRD.
GSFPS-3165	GS Ktr	Base	The GS <b>shall</b> have the capability for the operator to change the long-term archival storage status of any GS products, data item or file (i.e., identify as "for archive" or "not for archive.")

ID	Dev. Effort	Option	Requirement
GSFPS-2356			<b>8.3 Authorized User Services</b>
GSFPS-2995			The GS will have the capability to build a set of sectorized products per satellite for forwarding to the NWS AWIPS. Each product in the set will be defined by the operator. Products will be defined based on six parameters--corner points, map projection, spatial resolution, bit depth, ABI channel, and periodicity. The full set of sectorized products established by these parameters will be forwarded to AWIPS as they are produced. GS performance requirements with respect to sectorized products are defined in Appendix E.
GSFPS-2358	GS Ktr, OSO (CCR-01430)	Base	The GS <b>shall</b> provide all sectorized cloud and moisture imagery products to the NWS using the transfer mechanism specified in the Ground Segment (GS) To Advanced Weather Interactive Processing System (AWIPS) Interface Requirements Document (IRD) (417-R-IRD-0160).
GSFPS-3128	GS Ktr	Base	The GS <b>shall</b> be capable of producing and distributing sectorized products in accordance with Appendix E. (CCR01414)
GSFPS-2996	GS Ktr	Base	The GS <b>shall</b> provide the capability to modify the set of operator-defined sectorized cloud and moisture imagery products.
GSFPS-2998	GS Ktr	Base	The GS <b>shall</b> provide the capability for operator modification of sectorized cloud and moisture imagery product parameters.
GSFPS-3083	GS Ktr	Base	The GS <b>shall</b> be capable of producing sectorized cloud and moisture imagery products based on any single operator-selected ABI channel.
GSFPS-2957	GS Ktr	Base	The GS <b>shall</b> be capable of producing an operator-defined set of sectorized cloud and moisture imagery products.
GSFPS-3084	GS Ktr	Base	The GS <b>shall</b> have the capability to define sectorized cloud and moisture imagery products from CONUS imagery based on the following operator-configured parameters <ul style="list-style-type: none"> <li>a) Geographic coordinate corner points</li> <li>b) Map projection</li> <li>c) Spatial resolution</li> <li>d) Bit depth scaling</li> <li>e) ABI channel</li> <li>f) Periodicity</li> </ul>
GSFPS-3085	GS Ktr	Base	The GS <b>shall</b> have the capability to define sectorized cloud and moisture imagery products from Mesoscale imagery based on the following operator-configured parameters: <ul style="list-style-type: none"> <li>a) Map projection</li> <li>b) Spatial resolution</li> <li>c) Bit depth scaling</li> <li>d) ABI channel</li> <li>e) Periodicity</li> </ul>

ID	Dev. Effort	Option	Requirement
GSFPS-3086	GS Ktr	Base	The GS <b>shall</b> have the capability to define sectorized cloud and moisture imagery products from Full Disk imagery based on the following operator-configured parameters: <ul style="list-style-type: none"> <li>a) Geographic coordinate corner points</li> <li>b) Map projection</li> <li>c) Spatial resolution</li> <li>d) Bit depth scaling</li> <li>e) ABI channel</li> <li>f) Periodicity</li> </ul>
GSFPS-2684	GS Ktr	Base	The GS <b>shall</b> have the capability to remap sectorized cloud and moisture imagery products to the following projections: <ul style="list-style-type: none"> <li>a) Mercator</li> <li>b) Lambert Conformal</li> <li>c) Polar Stereographic</li> </ul>
GSFPS-2687	GS Ktr	Base	The GS <b>shall</b> have the capability to scale sectorized cloud and moisture imagery products across a range from full resolution to 8 bits based on operator configuration.
GSFPS-2688	GS Ktr	Base	The GS <b>shall</b> be capable of producing operator-defined reduced-resolution sectorized cloud and moisture imagery products with spatial resolution size range between 0.5 km and 28 km.
GSFPS-3000	GS Ktr	Base	The GS <b>shall</b> be capable of producing sectorized products with an operator-defined periodicity equal to or less frequently than the parent cloud and moisture imagery products are produced by the GS.
GSFPS-2576	GAS (CCR-01430)		The GS <b>shall</b> make any item placed in the 7-day revolving temporary storage by the GOES-R GS available through the GOES-R Access Point.
GSFPS-2366	GAS (CCR-01430)		The GS <b>shall</b> collect performance measurements on GOES-R Access Point new and retiring users, user requests, request acknowledgements, data and product transmissions and transaction information / latency.
GSFPS-1487	GAS (CCR-01430)		The GS <b>shall</b> manage user account information, including: user contact information, the level of service a user is authorized to request, links to related log entries, and user organization information.
GSFPS-2368	GAS (CCR-01430)		The GS <b>shall</b> report on GOES-R Access Point performance measurements.
GSFPS-2370	GAS (CCR-01430)		The GS <b>shall</b> administer GOES-R Access Point User accounts.
GSFPS-2372	GAS (CCR-01430)		The GS <b>shall</b> provide access to mission operations data sent from mission management to the GOES-R Access Subsystem. (CCR01330)
GSFPS-2578	GS Ktr	Base	The GS <b>shall</b> provide mission operations data, satellite configuration, instrument imaging schedules, maneuver schedules, special operations schedules, calibration plans and activities, unique payload configuration and status, spacecraft ephemerides, and acquisition data; to the GOES-R Access Subsystem. (CCR01330)
GSFPS-2374	GAS (CCR-01430)		The GS <b>shall</b> provide an Identification and Authentication mechanism, separate from that for operations personnel, for external Users (NIST SP 800-82) that meets the electronic authentication (eAuthentication) requirements of OMB M-04-04, E-Authentication Guidance for Federal Agencies, and NIST SP 800-63, Electronic Authentication Guideline.

ID	Dev. Effort	Option	Requirement
GSFPS-2376	GAS (CCR-01430)		The GS <b>shall</b> provide a subscription service to GOES-R Access Point Users that allows subscriptions to be configured by a minimum of the following parameters: a) Geographic Coverage Area b) Date c) Time d) Time period e) Product ID / name f) Quality flags g) Data format h) Spacecraft ID i) Channel number j) Instrument name k) Instrument mode l) Data type (CCR01392)
GSFPS-2689	GAS (CCR-01430)		The GS <b>shall</b> provide a data and information query service to GOES-R Access Point Users including at a minimum the following searchable parameters: a) Geographic Coverage Area b) Date c) Time d) Time period e) Product ID / name f) Quality flags g) Data format h) Spacecraft ID i) Channel number j) Instrument name k) Instrument mode l) Data type (CCR01392)
GSFPS-2690	GAS (CCR-01430)		The GS <b>shall</b> provide an ad hoc request service to GOES-R Access Point Users.
GSFPS-2380	GAS (CCR-01430)		The GS <b>shall</b> support a minimum of 1,000 users connected simultaneously to the GOES-R Access Point.
GSFPS-2382	GAS (CCR-01430)		The GS <b>shall</b> accommodate concurrent transfers of product files to 100 (TBR) ad hoc users through the GOES-R Access Point.
GSFPS-2916	GAS (CCR-01430)		The GS <b>shall</b> begin transfer of any requested and available product from the GOES-R Access Point to the requester within five (5) seconds (TBR) of ad hoc request validation.
GSFPS-2917	GAS (CCR-01430)		The GS <b>shall</b> begin the transfer of a subscribed product consistent with the latency in Appendix B, for those subscriptions fulfilled via the GOES-R Access Point. (CCR01291)
GSFPS-2384	GAS (CCR-01430)		The GS <b>shall</b> receive data requests from Users to the GOES-R Access Point.
GSFPS-2386	GAS (CCR-01430)		The GS <b>shall</b> validate data requests from Users to the GOES-R Access Point.
GSFPS-2388	GAS (CCR-01430)		The GS <b>shall</b> store data requests from Users to the GOES-R Access Point for 90 days in a product distribution log.

ID	Dev. Effort	Option	Requirement
GSFPS-2390	GAS (CCR-01430)		The GS <b>shall</b> check for duplicate data and product requests from the same GOES-R Access Point User as part of the request validation process.
GSFPS-2392	GAS (CCR-01430)		The GS <b>shall</b> provide help information to GOES-R Access Point Users when setting up their requests.
GSFPS-2406	GAS (CCR-01430)		The GS <b>shall</b> disseminate reports of status of queries and requests upon request from GOES-R Access Point Users.
GSFPS-2408	GAS (CCR-01430)		The GS <b>shall</b> fulfill requests from Users for product retransmission via the GOES-R Access Point for up to 7-days after product generation.
GSFPS-2412	GS Ktr, GAS (CCR-01430)	Base	The GS <b>shall</b> collect product availability and status information.
GSFPS-2577	GS Ktr, GAS (CCR-01430)	Base	The GS <b>shall</b> report product availability and status information.
GSFPS-2414	GAS (CCR-01430)		The GS <b>shall</b> provide product status to GOES-R Access Point Users on request.
GSFPS-2420			<b>8.4 Data Product Delivery</b>
GSFPS-2582	GS Ktr	Base	The GS <b>shall</b> forward filtered event messages of product distribution events to EM.
GSFPS-2581	GS Ktr	Base	The GS <b>shall</b> selectively filter PD event messages based on operator designation for forwarding to EM.
GSFPS-2691	GS Ktr, GAS (CCR-01430)	Base	The GS <b>shall</b> collect and report to EM performance measures at a level of detail sufficient to assess the margin on a per-process and per-product basis for product latency and refresh.
GSFPS-2579	GS Ktr, GAS, OSO (CCR-01430)	Base	The GS <b>shall</b> capture event messages of product distribution events.
GSFPS-2428	GAS (CCR-01430)		The GS <b>shall</b> process a minimum of 200 (TBR) simultaneous subscription service data transfers.
GSFPS-2422	GAS (CCR-01430)		The GS <b>shall</b> notify subscription users when subscribed products are available at the GOES-R Access Point. (CCR01394)
GSFPS-2424	GAS (CCR-01430)		The GS <b>shall</b> post the product manifest within 1 second after a product is posted to the GOES-R Access Point.
GSFPS-3137	GAS (CCR-01430)		The GS <b>shall</b> be capable of transferring data from the GOES-R Access Point to users at a minimum combined rate of 500 Mbps (TBR).
GSFPS-3153	OSO		The GS <b>shall</b> transfer data from the GOES-R Access Point to users at a minimum combined rate of 500 Mbps (TBR).
GSFPS-2583			<b>8.5 Product Distribution Storage</b>
GSFPS-2303	GAS (CCR-01430)		The GS <b>shall</b> store L1b and L2+ products, ancillary data, metadata, Instrument Calibration Data, and the sample outlier files in a 7-day revolving temporary store at the NSOF. (CCR01399)
GSFPS-3113	GAS (CCR-01430)		The GS <b>shall</b> have the capability to retrieve, display, export, and store for the life of the mission operator-selected data from the 7-day revolving temporary storage.

This page intentionally left blank.



**Appendix A: End Product Performance Parameter Tables**

**Release Number** - Subset of the total GOES-R products indicating which products are required for implementation at certain delivery milestones.

**Product Geographic Coverage / Conditions** - Product geographic coverage is defined as the size of the area that must be observed in the revisit time in order to complete the product; in the case of CONUS, it also specifies a particular area as well as location. The GOES-R products will be calculated for the coverage areas of the L1b data provided by the instrument subject to the Product Qualifiers.

**Product Orthogonality / Coverage** - Product Orthogonality / Coverage is defined for the Space and Solar Products only and is nominally the equivalent of the Product Geographic Coverage.

**Product Vertical Resolution** - Product vertical resolution is defined as layering averaging of the resultant samples corresponding to different heights in the atmosphere; where only one vertical sample is collected, no layer averaging is needed. The GOES-R System will produce the required vertical layering of the GOES-R products employing external data sources if needed. For typical imaging products, the vertical layering is typically over the total column.

**Product Horizontal Resolution** - Product horizontal resolution is defined as the finest horizontal spatial element of the product measured at nadir. The GOES-R System will not spatially degrade the product horizontal resolution beyond that of the L1b data of the earth-looking instruments when making Level 2 and higher products, except in the generation of GOES-R products with coarser horizontal resolution.

**Product Horizontal/Angular Resolution** - Product Horizontal/Angular Resolution is defined for the Space and Solar Products only and is nominally the equivalent of the Product Horizontal Resolution.

**Product Mapping Accuracy (Product Navigation)** - Product navigation or more generally product mapping accuracy is defined as the accuracy of the registration of the collected data to the appropriate earth or other reference frame. The GOES-R System will geolocate the GOES-R series L1b data (which meets instrument image navigation and registration requirement for earth-looking instruments) to comply with the product mapping accuracy requirements.

**Product Pointing/Mapping Accuracy** - Product Pointing/Mapping Accuracy is defined for the Space and Solar Products only and is the equivalent of the Product Mapping Accuracy.

**Product Pointing Knowledge / Mapping Uncertainty** - Product Pointing Knowledge / Mapping Uncertainty is defined for the Space and Solar Products only as the knowledge of the line of sight of the space and solar instruments.

**Product Measurement Range** - Product Measurement Range is defined as the range from the minimum to the maximum values over which the product will be measured.

**Categorical Product** -- A product whose output is limited to a set of discrete values. (CCR01326)

**Product Measurement Accuracy (non-categorical products)** - Product Measurement Accuracy is defined for non-categorical products as the systematic difference or bias between the derived parameter and truth. It is determined by computing the absolute value of the average of differences between the derived parameter and truth over a statistically significant population of data such that the magnitude of the random error is negligible relative to the magnitude of the systematic error. (CCR01292)

**Product Measurement Accuracy (categorical products)** - Product Measurement Accuracy for categorical products is defined in terms of the percentage of correct classification over a statistically significant population of data. (CCR01292)

**Product Refresh Rate/Coverage Time** - Product Refresh Rate/Coverage Time is defined as the time between the completion of the nth update of the product and the completion of the (n+1)th update of the same product for the user. The GOES-R baseline product tables list refresh times for products. However, ABI data may be produced more frequently than the listed times, particularly due to the different scan modes of ABI. Products that rely on surface observations with product refreshes that are long, compared to the instrument image refresh times, benefit from observations without obscurations caused by clouds. The product refresh is often longer than the coverage time associated with the data collection, as with the GLM in which case the longer of the two is listed for this composite parameter. (CCR01282)

**Ground Data Latency** - Product-dependent baseline maximum time allocated to the GS, defined as:

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

- a) the time between the receipt of the last image data packet on the ground and delivery to the AWIPS demarcation point in the case of sectorized products, and
- b) the time between the receipt of the last image data packet on the ground and the end-point of the GOES-R Access Subsystem in the case of all other products. (CCR01333)

**Vendor Allocated Ground Latency** - Product-dependent baseline maximum time allocated to the GS vendor, defined as the time between the arrival of the last data packet of an observation at the intermediate frequency conversion and the arrival of the last bit of a GOES-R product at either:

- a) the AWIPS demarcation point in the case of sectorized products, or
- b) the ingest point of the GOES-R Access Subsystem in the case of all other products. (CCR01333)

**Antenna Allocated Ground Latency** - Sum of the 1) Baseline maximum time allocated between the receiving of the data in the last packet of the observation at the RF input to the antenna and the intermediate frequency conversion and 2) Baseline maximum time between the intermediate frequency on the transmit side of the GRB transmitter on the ground at CDAS and the intermediate frequency on the received side of the GRB transmitter on the ground at NSOF. (CCR01333)

**GOES-R Access Subsystem Allocated Ground Latency** - Baseline maximum time between the arrival of the last bit of a GOES-R product at the ingest point of the GAS and:

- a) the time when the file is ready to be pushed to the external recipient
- b) the time when the file is staged and available to be pulled by the external recipient. (CCR01333)

**Product Long-Term Stability** - Product Long Term Stability is defined as the deviation in accuracy over a period of time, typically the lifetime of the mission, unless otherwise specified in the product long-term stability values.

**Product Measurement Precision (non-categorical products)** - Product measurement precision is the one-sigma standard deviation of the differences between the derived parameters and their corresponding truth over the same population of data used to compute the product measurement accuracy. (CCR01292)

**Product Measurement Precision (categorical products)** - Product Measurement Precision for categorical products is:

- a) For three or more categories: defined as the standard deviation of the misclassification error (number of bins away from the correct bin) over a statistically significant population of data.
- b) For two categories: not applicable. (CCR01292)

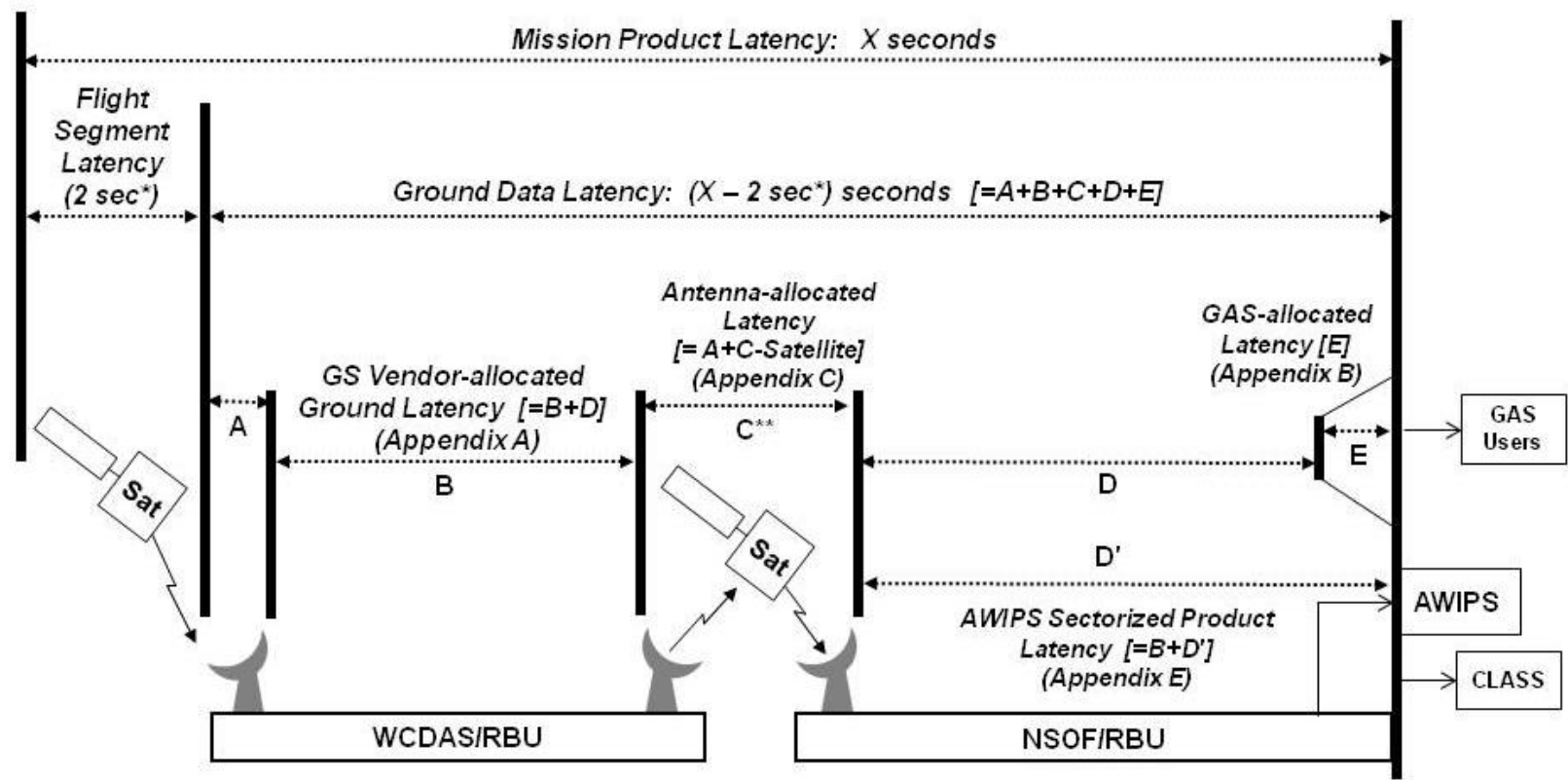
**Temporal Coverage Qualifier** - The Temporal Coverage Qualifier provides product-specific limitations to the solar zenith angle coverage of the products. When the term Day is used in the temporal qualifier, Day is defined as solar zenith angles less than or equal to 96 degrees. When the term Night is used in the temporal qualifier, Night is defined as solar zenith angles greater than 96 degrees and includes the period of twilight.

**Product Extent Qualifier** - The Product Extent Qualifier provides product specific limitations to the solar zenith angle coverage of the products over which a product can be computed. The use of the term quantitative in any of the product extent qualifiers defines the generation of the product while meeting the threshold product measurement accuracy performance in that region, whereas the use of qualitative in any of the product extent qualifiers defines the generation of the product without meeting the threshold product measurement accuracy performance requirements. For CONUS (3000 km x 5000 km) products and mesoscale (1000 km x 1000 km) products, the product will be computed within the CONUS-sized measurement area and the mesoscale-sized measurement area that falls within the product qualifier limitations.

**Cloud Cover Conditions Qualifier** - The Cloud Cover Conditions Qualifier provides product specific limitations to the cloud cover associated with the threshold accuracy.

**Product Statistics Qualifier** - The Product Statistics Qualifier provides product specific limitations, where applicable, to the product generation scene statistics under which the product measurement accuracies apply.

## Allocation of Mission Product Latency



\*Flight Segment Latency is 2 seconds for all products except Solar Imagery: X-Ray, which is 4 sec

\*\* This latency period includes the satellite transponder time for GRB (<1 millisecond)

Figure 2: Allocation of Mission Product Latency (CCR-01365)

Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option /1 or 2/	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Product Refresh Rate/ Coverage Time (B) (ABI Mode 3)	Refresh Rate / Coverage Time (B) Mode 4	VAGL (B) Mode 3	VAGL (B) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Aerosol Detection (including Smoke and Dust)	1	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Total Column	2 km	1 km	Binary yes/no detection above threshold 0.2 (for aerosol optical thickness)	20% classification error	15 min	15 min	CONUS: 806 sec Full Disk: 806 sec Mesoscale: 806 sec	CONUS: 806 sec Full Disk: 806 sec	10%	Atmosphere	Aerosols
Suspended Matter / Optical Depth	1	B	NetCDF McIDAS	4	No	2+	CONUS & Full Disk	Total Column	2 km	1.0 km	0.04-3.0 in optical depth (retain negative retrievals)	20% classification error over land, 10% classification error over ocean; 30% error in optical depth	CONUS: 5 min & Full Disk: 15 min	CONUS: 5 min & Full Disk: 15 min	CONUS: 266 sec Full Disk: 806 sec	CONUS: 266 sec Full Disk: 806 sec	13%	Atmosphere	Aerosols
Volcanic Ash: Detection and Height	2	B	NetCDF McIDAS	2	No	2+	Full Disk	3 km (top height)	2 km	1.0 km	0-50 tons/km2	2 ton/km2	15 min	15 min	430 sec	430 sec	10%	Atmosphere	Aerosols
Cloud & Moisture Imagery	1	B	NetCDF McIDAS	54	Yes	2+	CONUS & Full Disk & Mesoscale	Not Applicable	2 km, with finer daytime observations	1.0 km	Not Applicable	Not Applicable	CONUS: 5 min & Full Disk: 15 min & Mesoscale: 30 sec	CONUS: 5 min & Full Disk: 5 min	CONUS: 50 sec Full Disk: 50 sec Mesoscale: 23 sec	CONUS: 50 sec Full Disk: 50 sec	N/A	Atmosphere	Clouds
Cloud Optical Depth	1	B	NetCDF McIDAS	4	No	2+	CONUS: for optical depth > 1 & Full Disk: for optical depth > 1	Total column	CONUS: 2 km & Full Disk: 4 km	CONUS: 1 km-Full Disk: 2 km	0.5 - 50	20%	CONUS: 15 min & Full Disk: 15 min	CONUS: 15 min & Full Disk: 15 min	CONUS: 806 sec Full Disk: 806 sec	CONUS: 806 sec Full Disk: 806 sec	10%	Atmosphere	Clouds

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Product Refresh Rate/ Coverage Time (B) (ABI Mode 3)	Refresh Rate / Coverage Time (B) Mode 4	VAGL (B) Mode 3	VAGL (B) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Cloud Particle Size Distribution	1	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Cloud Top	2 km	1.0 km	0 - 50 µm	4 µm for liquid phase, 10 µm for ice phase	CONUS: 5 min, & Full Disk: 15 min & Mesoscale: 5 min	CONUS: 5 min, & Full Disk: 15 min	CONUS: 266 sec Full Disk: 806 sec Mesoscale: 266 sec	CONUS: 266 sec Full Disk: 806 sec	2 um	Atmosphere	Clouds
Cloud Top Phase	1	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Cloud Top	2 km	1.0 km	Liquid /solid / supercooled / mixed	20% classification error	CONUS: 5 min & Full Disk: 15 min & Mesoscale: 5 min	CONUS: 5 min & Full Disk: 15 min	CONUS: 266 sec Full Disk: 806 sec Mesoscale: 266 sec	CONUS: 266 sec Full Disk: 806 sec	20%	Atmosphere	Clouds
Cloud Top Height	1	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Cloud top	CONUS: 10 km & Full Disk: 10 km & Mesoscale: 4 km	CONUS: 5 km-Full Disk: 5 km-Mesoscale: 2 km	CONUS: 100m - 300hPa & Full Disk: 0 - 15 km & Mesoscale: 0 - 20 km	500 m for low level clouds with emissivity > 0.5	CONUS: 60 min, & Full Disk: 60 min & Mesoscale: 5 min	CONUS: 60 min, & Full Disk: 60 min	CONUS: 266 sec, Full Disk: 806 sec Mesoscale: 266 sec	CONUS: 266 sec, Full Disk: 806 sec	1.3 km	Atmosphere	Clouds
Cloud Top Pressure	1	B	NetCDF McIDAS	4	No	2+	CONUS & Full Disk	Cloud top	10 km	5 km	CONUS: 100-1000 hPa Full Disk: 100 - 1000 mb	100 mb for low level clouds with emissivity > 0.5	60 min	60 min	CONUS: 536 sec, Full Disk: 806 sec	CONUS: 536 sec, Full Disk: 806 sec	10 mb	Atmosphere	Clouds
Cloud Top Temperature	1	B	NetCDF McIDAS	4	No	2+	Full Disk & Mesoscale	At Cloud Tops	2 km	1.0 km	180-300 K	1.0 K for known emissivity = 1.0 and known atmosphere and low clouds; 4 K for low level cloud emissivity > 0.5	Full Disk: 15 min & Mesoscale: 5 min	Full Disk: 15 min	Full Disk: 806 sec Mesoscale: 266 sec	Full Disk: 806 sec	1 K	Atmosphere	Clouds

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Product Refresh Rate/ Coverage Time (B) (ABI Mode 3)	Refresh Rate / Coverage Time (B) Mode 4	VAGL (B) Mode 3	VAGL (B) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Hurricane Intensity	2	B	NetCDF McIDAS	2	No	2+	Full Disk	Not Applicable	2 km	1.0 km	Dvorak hurricane intensity scale values of 4 - 8 or leading to wind speeds of 33.4 m/s (65 knots) to 87.5 m/s (170 knots)	5 m/s over ocean	30 min	30 min	Full Disk: 806 sec	Full Disk: 806 sec	5 m/s over the ocean	Atmosphere	Clouds
Lightning Detection: 1) Events and 2)Flashes	1	B	NetCDF McIDAS	12	Yes	2+	CONUS & Full Disk & Mesoscale	Surface to cloud top	10 km	5 km	Real time	70% total strikes detection	continuous	continuous	CONUS: 50 sec Full Disk: 50 sec Mesoscale: 50 sec	CONUS: 50 sec Full Disk: 50 sec	5%	Atmosphere	Clouds
Rainfall Rate/QPE	2	B	NetCDF McIDAS	2	No	2+	Full Disk	Not Applicable	2 km	1.0 km	0-100 mm/hr	2 mm/hr at 30 mm/hr rate, with higher values at higher rates	15 min	15 min	Full Disk: 266 sec	Full Disk: 266 sec	2 mm/hr at 30 mm/hr rate, with higher values at higher rates	Atmosphere	Precipitation

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.



Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Product Refresh Rate/ Coverage Time (B) (ABI Mode 3)	Refresh Rate / Coverage Time (B) Mode 4	VAGL (B) Mode 3	VAGL (B) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Legacy Vertical Moisture Profile	1	B	NetCDF McIDAS	6	No	2+	CONUS - Clear and Above Cloud Regions only & Full Disk - Clear and Above Cloud Regions only & Mesoscale - Clear and Above Cloud Regions only	Reflects layering of Numerical Weather Prediction Models; inherent vertical resolution is only 3 to 5 km	10 km	5 km	0 - 100%	Sfc-500 mb: 18 % relative humidity & 500-300 mb: 18% relative humidity & 300-100 mb: 20% relative humidity	Full Disk : 60 min & CONUS: 30 min & Mesoscale: 5 min	Full Disk : 60 min & CONUS: 30 min	CONUS: 266 sec & Full Disk: 266 sec & Mesoscale: 266 sec	CONUS: 266 sec & Full Disk: 266 sec	Sfc-500 mb: 18 % relative humidity 500-300 mb: 18% relative humidity 300-100 mb: 20% relative humidity	Atmosphere	Profiles

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Product Refresh Rate/ Coverage Time (B) (ABI Mode 3)	Refresh Rate / Coverage Time (B) Mode 4	VAGL (B) Mode 3	VAGL (B) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Legacy Vertical Temperature Profile	1	B	NetCDF McIDAS	6	No	2+	CONUS - Clear and Above Cloud Regions only & Full Disk - Clear and Above Cloud Regions only & Mesoscale - Clear and Above Cloud Regions only	Reflects layering of Numerical Weather Prediction Models; inherent vertical resolution is only 3 to 5 km	10 km	5 km	180 - 320 K	0.1 K improvement over numerical weather prediction model analysis	Full Disk : 60 min & CONUS: 30 min & Mesoscale: 5 min	Full Disk : 60 min & CONUS: 30 min	CONUS: 266 sec & Full Disk: 266 sec & Mesoscale: 266 sec	CONUS: 266 sec & Full Disk: 266 sec	0.1 K improvement over numerical weather prediction model analysis	Atmosphere	Profiles
Derived Stability Indices (5 indices: CAPE, Lifted Index, K-index, Showalter Index, Total Totals)	2	B	NetCDF McIDAS	30	No	2+	CONUS & Mesoscale	Not Applicable	CONUS: 4 km & Mesoscale: 4 km	2 km	Lifted Index: -- 10 to 40 K & CAPE: 0 to 5000 J/kg & Showalter index: >4 to - 10 K & Total totals Index: - 43 to > 56 & K index: 0 to 40	Lifted Index: +/- 2.0 K & CAPE: 1000 J/ kg & Showalter index: +/- 2 K & Total totals Index: +/-1 & K index: +/- 2	CONUS: 30 min & Mesoscale: 5 min	CONUS: 30 min	CONUS: 159 sec & Mesoscale: 266 sec	CONUS: 159 sec	Lifted Index: +/- 6.5 K & CAPE: 2500 J/ kg & Showalter index: +/- 6.5 K & Total totals Index: +/-4 K & K index: +/- 5 K	Atmosphere	Profiles

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Product Refresh Rate/ Coverage Time (B) (ABI Mode 3)	Refresh Rate / Coverage Time (B) Mode 4	VAGL (B) Mode 3	VAGL (B) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Total Precipitable Water	1	B	NetCDF McIDAS	6	No	2+	CONUS: Clear and Above Cloud Regions Only & Full Disk: Clear and Above Cloud Regions Only & Mesoscale: Clear and Above Cloud Regions Only	Not Applicable	10 km	2 km	0 - 100 mm	10% compared to ground based truth	CONUS: 30 min & Full Disk: 60 min & Mesoscale: 5 min	CONUS: 30 min & Full Disk: 60 min	CONUS: 266 sec & Full Disk: 806 sec & Mesoscale: 266 sec	CONUS: 266 sec & Full Disk: 806 sec	3 mm	Atmosphere	Profiles
Clear Sky Masks	1	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Not Applicable	2 km	1 km	0 - 1 Binary	13% probability of incorrect detection	CONUS: 15 min & Full Disk: 15 min & Mesoscale: 5 min	CONUS: 15 min & Full Disk: 15 min	CONUS: 266 sec & Full Disk: 806 sec & Mesoscale: 266 sec	CONUS: 266 sec & Full Disk: 806 sec	10%	Atmosphere	Radiances

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Product Refresh Rate/ Coverage Time (B) (ABI Mode 3)	Refresh Rate / Coverage Time (B) Mode 4	VAGL (B) Mode 3	VAGL (B) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Radiances	1	B	NetCDF McIDAS	6	Yes	1b	CONUS: Clear and Cloud Regions only & Full Disk: Clear and Cloud Regions only & Mesoscale: Clear and Cloud Regions only	Not Applicable	Individual channel resolutions (0.5 km, 1.0 km, and 2.0 km)	One half of individual channel resolutions (0.5 km, 1.0 km, and 2.0 km)	180K-320K when converted to brightness temperature units	1.0 K when converted to in brightness temperature units for known emissivity	CONUS: 15 min & Full Disk: 15 min & Mesoscale: 5 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 266 sec & Full Disk: 806 sec & Mesoscale: 266 sec	CONUS: 266 sec & Full Disk: 806 sec	0.4 K when converted to in brightness temperature units for known emissivity	Atmosphere	Radiances
Downward Solar Insolation: Surface	2	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Not Applicable	CONUS: 25 km & Full Disk: 50 km & Mesoscale: 5 km	CONUS: 2 km-Full Disk: 4 km-Mesoscale: 1 km	0-1500 W/m2	+/- 60 W/m2 at high end of range for known cloud fraction (1500 W/m2) & +/- 40 W/m2 at typical value/ mid-point for known cloud fraction ( 350 W/m2)	60 min	60 min	CONUS: 3236 sec & Full Disk: 3236 sec & Mesoscale: 3236 sec	CONUS: 3236 sec & Full Disk: 3236 sec	30 W/m2 for known cloud fraction	Atmosphere	Radiation

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Product Refresh Rate/ Coverage Time (B) (ABI Mode 3)	Refresh Rate / Coverage Time (B) Mode 4	VAGL (B) Mode 3	VAGL (B) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Reflected Solar Insolation: TOA	2	B	NetCDF McIDAS	4	No	2+	CONUS & Full Disk	Not Applicable	CONUS: 25 km & Full Disk: 100 km	CONUS: 2 km-Full Disk: 4 km	0-1300 W/m2	CONUS: +/- 60 W/m2 at high end of range (1300 W/m2) +/- 40 W/m2 at typical value/mid-point (350 W/m2) & Full Disk: +/- 60 W/m2 at high end of range (1500 W/m2) +/- 40 W/m2 at typical value/mid-point (350 W/m2)	60 min	60 min	CONUS: 3236 sec & Full Disk: 3236 sec	CONUS: 3236 sec & Full Disk: 3236 sec	15 W/m2	Atmosphere	Radiation

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Product Refresh Rate/ Coverage Time (B) (ABI Mode 3)	Refresh Rate / Coverage Time (B) Mode 4	VAGL (B) Mode 3	VAGL (B) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Derived Motion Winds	2	B	NetCDF McIDAS	36	No	2+	CONUS & Full Disk & Mesoscale	Cloud Motion Vector winds: At cloud tops; Clear-Sky Water Vapor winds: 200 mb	10 km	5 km	Speed: 0-300 kts (0 to 155 m/s) & Direction: 0 to 360 degrees	Speed: 6 m/s & Direction: < 20 degrees	CONUS: 15 min (based on 3 sequential images 5 minutes apart) & Full Disk: 60 min (based single set of 3 sequential images 5 minutes apart) & Mesoscale : 15 min (based on 3 sequential 5 minute images of the same area)	CONUS: 15 min (based on 3 sequential images 5 minutes apart) & Full Disk: 15 min (based single set of 3 sequential images 5 minutes apart)	CONUS: 806 sec & Full Disk: 806 sec & Mesoscale: 806 sec	CONUS: 806 sec & Full Disk: 806 sec	2 m/sec	Atmosphere	Winds
Fire / Hot Spot Characterization:	2	B	NetCDF McIDAS	8	No	2+	CONUS & Full Disk	Not Applicable	2 km	1.0 km	275 to 400 K	2.0 K within dynamic range	CONUS: 5 min & Full Disk: 15 min	CONUS: 5 min & Full Disk: 15 min	CONUS: 266 sec & Full Disk: 806 sec	CONUS: 266 sec & Full Disk: 806 sec	2.0 K	Land	Land

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.



Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Product Refresh Rate/ Coverage Time (B) (ABI Mode 3)	Refresh Rate / Coverage Time (B) Mode 4	VAGL (B) Mode 3	VAGL (B) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Land Surface (Skin) Temperature	2	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Not Applicable	CONUS: 2 km & Full Disk: 10 km & Mesoscale: 2 km	CONUS: 1 km-Full Disk: 5 km-Mesoscale: 1 km	CONUS: 233-333 K Full Disk: 230-330 K Mesoscale: 213-333 K	2.5 K with known emissivity, known atmospheric correction, and 80% channel correlation; 5 K otherwise	60 min	60 min	CONUS: 3236 sec & Full Disk: 806 sec & Mesoscale: 159 sec	CONUS: 266 sec & Full Disk: 806 sec	2.3 K	Land	Land
Snow Cover	2	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Not Applicable	2 km	1.0 km	Binary yes / no detection	30%	60 min	60 min	CONUS: 3236 sec & Full Disk: 3236 sec & Mesoscale: 3236 sec	CONUS: 3236 sec & Full Disk: 3236 sec	5%	Land	Land
Sea Surface Temps	2	B	NetCDF McIDAS	6	No	2+	CONUS and US navigable waters thru EEZ & Full Disk & Mesoscale	Not Applicable	2 km	1.0 km	CONUS: 270 to 313 K Full Disk: 271-313 K Mesoscale: 270-313 K	2.1 K with known emissivity, known atmospheric correction, and 80% channel correlation; 3.1 K otherwise	CONUS: 60 min & Full Disk: 60 min & Mesoscale: 60 min	CONUS: 60 min & Full Disk: 60 min	CONUS: 806 sec & Full Disk: 806 sec & Mesoscale: 806 sec	CONUS: 806 sec & Full Disk: 806 sec	1.0 K	Ocean	Ocean

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Product Refresh Rate/ Coverage Time (B) (ABI Mode 3)	Refresh Rate / Coverage Time (B) Mode 4	VAGL (B) Mode 3	VAGL (B) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Energetic Heavy Ions	1	B	NetCDF	1	Yes	1b	1 direction	Not Applicable	Not Applicable	Not Applicable	10 to 200 MeV/n-4 mass groups: He, (C,N,O), Ne-S, & Fe	25%	5 min	5 min	267 sec	267 sec	Flux values associated with 10 counts above background in 5-min interval.	Space & Solar	Energetic Particles
Magnetospheric Electrons and Protons: Low Energy	1	B	NetCDF	1	Yes	1b	5 directions	Not Applicable	Not Applicable	Not Applicable	Electron and Protons: 30 eV to 30 keV	25%	30 sec	30 sec	51 sec	51 sec	Flux values associated with 10 counts above background in 5-min interval.	Space & Solar	Energetic Particles
Magnetospheric Electrons and Protons: Medium & High Energy	1	B	NetCDF	1	Yes	1b	5 directions	Not Applicable	Not Applicable	Not Applicable	Electrons: 30 keV to 4 MeV Protons: 30 keV to 1 MeV	25%	30 sec	30 sec	51 sec	51 sec	Flux values associated with 10 counts above background in 5-min interval.	Space & Solar	Energetic Particles
Solar and Galactic Protons	1	B	NetCDF	1	Yes	1b	2 directions	Not Applicable	Not Applicable	Not Applicable	1 MeV to 500 MeV & Differential Measurements	25%	1 min	1 min	51 sec	51 sec	Flux values associated with 10 counts above background in 5-min interval.	Space & Solar	Energetic Particles
Geomagnetic Field	1	B	NetCDF	1	Yes	1b	3-axis 0.5°	Not Applicable	+/- 0.25°	+/- 1°	> = +/- 512 nT/axis (3-axis vector)	1.0 nT (per axis)	2 samples per sec	2 samples per sec	1.8 sec	1.8 sec	0.016 nT	Space & Solar	Magnetic Field

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 1: Baseline End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Product Refresh Rate/ Coverage Time (B) (ABI Mode 3)	Refresh Rate / Coverage Time (B) Mode 4	VAGL (B) Mode 3	VAGL (B) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Solar Flux: EUV	1	B	NetCDF	1	Yes	1b	Solar Disk (40 arcmin)	Not Applicable	Not Applicable	+/-2 arcmin	0.5x Sol Min , 10x Sol Max	20%	30 sec	30 sec	24 sec	24 sec	2%	Space & Solar	Solar
Solar Flux: X-Ray	1	B	NetCDF	1	Yes	1b	Solar Disk (40 arcmin)	Not Applicable	Not Applicable	+/-2 arcmin	XRSA: 5x10-9 to 5x10-4 W/m2 XRSB: 2x10-8 to 2x10-3 W/m2	+/- 20%	3 sec	3 sec	1.8 sec	1.8 sec	2%	Space & Solar	Solar
Solar Imagery: X-Ray	1	B	NetCDF FITS	2	Yes	1b	0.0-1.3 Solar Radii	7.0 arcsec	Stability during 24 hours: 1.0 arcmin of sun center (N-S, E-W) (1 sigma)- 3.0 arcmin of sun center (N-S, E-W) (3 sigma) & Stability during 60 seconds: 2.0 arc seconds of sun center (E-W, N-S) (1 sigma)- 6.0 arcsec of sun center (E-W, N-S) (3 sigma)	+/-2.5 arcsec	Radiance: 0.3- 10^6 ph/cm2/arcsec/ sec & Temperature: 1 to 10 MK	+/-40% in radiance	Image: <2 min & Temp: < 6 min	Image: <2 min & Temp: < 6 min	<50 sec	<50 sec	+/-40% in radiance	Space & Solar	Solar

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Effective Date: Date of Last Signature  
Responsible Organization: GOES-R/Code 417

G417-R-FPS-0089  
Version 1.10

NOTE: There are 54 KPP Cloud and Moisture Imagery End-Products (48 single band End-Products in NETCDF format at the resolution native to each band and one multiband product at 2 km resolution in both NETCDF & McIDAS Area file formats). This number is arrived at as follows:

Single band products: 16 products \* 1 format (NETCDF) \* 3 coverage areas (Full Disk, CONUS, Mesoscale)  
Multiband products: 1 product \* 2 formats (NETCDF and McIDAS Area)\* 3 coverage areas (Full Disk, CONUS, Mesoscale)  
(CCR01313, CCR01368)

NOTE: The number of Derived Motion Winds End-Products is derived from 6 unique outputs multiplied by 3 coverage areas in two formats each.

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 2: Product Qualifiers

Appendix A Table 2: Product Qualifiers				
Observational Requirements	Temporal Coverage Qualifiers (Threshold)	Product Extent Qualifier (Threshold)	Cloud Cover Conditions Qualifier (Threshold)	Product Statistics Qualifier (Threshold)
<b>Observational Requirements: ATMOSPHERE</b>				
<b>AEROSOLS</b>				
Aerosol Detection (including Smoke and Dust)	Day	Quantitative out to at least 60 degrees LZA (Threshold) and qualitative at larger LZA	Clear conditions down to feature of interest associated with threshold accuracy	Over specified geographic area
Aerosol Particle Size	Day	Quantitative out to at least 60 degrees LZA (Threshold) and qualitative at larger LZA	Clear conditions down to feature of interest associated with threshold accuracy	Over specified geographic area
Suspended Matter / Optical Depth	Daytime at a minimum	Quantitative out to at least 60 degrees LZA (Threshold) and qualitative beyond	Clear conditions down to feature of interest associated with threshold accuracy	Over specified geographic area
Volcanic Ash: Detection and Height	Day and night	Quantitative out to at least 60 degrees LZA (Threshold) and qualitative beyond	Clear conditions down to feature of interest associated with threshold accuracy	Over volcanic ash cases
<b>CLOUDS</b>				
Aircraft Icing Threat	Day and night	Quantitative out to at least 60 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Cloud Ice Water Path	Day and night	Quantitative out to at least 65 degrees LZA and qualitative beyond	In presence of limited clouds with optical depths between 1.0 and 60 (day)	Over specified geographic area
Cloud Imagery: Coastal	Day and night	Not applicable	In presence of clear air and clouds	Over specified geographic area
Cloud Layers / Heights and Thickness	Day and night	Quantitative out to at least 62 degrees LZA and qualitative beyond	In presence of clouds with optical depth > 1. Clear conditions down to cloud top associated with threshold accuracy.	Over specified geographic area
Cloud Liquid Water	Day and night	Quantitative out to at least 65 degrees LZA and qualitative beyond	In presence of limited clouds with optical depths between 2.0 and 60 (day)	Over specified geographic area
Cloud & Moisture Imagery	Day and night	Not applicable	In presence of clear air and clouds	Over specified geographic area
Cloud Optical Depth	Day and night	Quantitative out to at least 65 degrees LZA and qualitative beyond	In presence of clouds with optical depth > 1	Over specified geographic area
Cloud Particle Size Distribution	Day and night	Day and night; quantitative out to at least 65 degrees LZA and qualitative beyond	In presence of clouds with optical depths >2 and <60	Over specified geographic area
Cloud Top Phase	Day and night	Quantitative out to at least 65 degrees LZA and qualitative beyond	In presence of clouds with optical depth > 1. Clear conditions down to cloud top associated with threshold accuracy.	Over specified geographic area
Cloud Top Height	Day and night	Quantitative out to at least 62 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy.	Over specified geographic area
Cloud Top Pressure	Day and night	Quantitative out to at least 62 degrees LZA and qualitative beyond	In presence of clouds with optical depth > 1. Clear conditions down to cloud top associated with threshold accuracy.	Over specified geographic area
Cloud Top Temperature	Day and night	Quantitative out to at least 65 degrees LZA and qualitative beyond	In presence of clouds with optical depth > 1. Clear conditions down to cloud top associated with threshold accuracy.	Over specified geographic area
Cloud Type	Day and night	Quantitative out to at least 65 degrees LZA and qualitative beyond	In presence of clouds with optical depth > 1. Clear conditions down to cloud top associated with threshold accuracy.	Over specified geographic area
Convective Initiation	Day and night	Quantitative out to at least 65 degrees LZA and qualitative beyond	Clear conditions down to feature of interest associated with threshold accuracy	Over specified geographic area

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 2: Product Qualifiers				
Observational Requirements	Temporal Coverage Qualifiers (Threshold)	Product Extent Qualifier (Threshold)	Cloud Cover Conditions Qualifier (Threshold)	Product Statistics Qualifier (Threshold)
Enhanced "V" / Overshooting Top Detection	Day and night	Quantitative out to at least 65 degrees LZA and qualitative beyond	Clear conditions down to feature of interest associated with threshold accuracy	Over enhanced V / overshooting top cases
Hurricane Intensity	Day and night	Quantitative out to at least 65 degrees LZA and qualitative beyond	Clear conditions down to feature of interest associated with threshold accuracy	Over hurricane cases
Lightning Detection: 1) Events and 2)Flashes	Day and night	Quantitative out to at least 65 degrees LZA and qualitative beyond	Cloud cover conditions permitting observation of lightning associated with threshold accuracy	Over lightning cases
Low Cloud and Fog	Day and night	Quantitative out to at least 70 degrees LZA and qualitative beyond	Clear conditions down to feature of interest (no high clouds obscuring fog) associated with threshold accuracy	Over low cloud and fog cases with at least 42% occurrence in the region
Turbulence	Day and night	Quantitative out to at least 70 degrees LZA and qualitative beyond	Clear conditions down to feature of interest associated with threshold accuracy	Over turbulence cases with at least 25% occurrence in surrounding regions
Visibility	Day	Quantitative out to at least 70 degrees LZA and qualitative beyond	Clear conditions down to feature of interest associated with threshold accuracy	Over specified geographic area
PRECIPITATION				
Probability of Rainfall	Day and night	Quantitative out to at least 70 degrees LZA and qualitative beyond	N/A	Over rain cases and mesoscale-sized surrounding regions
Rainfall Potential	Day and night	Quantitative out to at least 70 degrees LZA and qualitative beyond	N/A	Over rainfall cases
Rainfall Rate/QPE	Day and night	Quantitative out to at least 70 degrees LZA and qualitative beyond	N/A	Over rain cases and mesoscale-sized surrounding regions
PROFILES				
Legacy Vertical Moisture Profile	Day and night	Quantitative out to at least 62 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Legacy Vertical Temperature Profile	Day and night	Quantitative out to at least 62 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Derived Stability Indices (5 indices: CAPE, Lifted Index, K-index, Showalter Index, Total Totals)	Day and night	Quantitative out to at least 62 degrees LZA and qualitative beyond and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Total Precipitable Water	Day and night	Quantitative out to at least 62 degrees LZA and qualitative beyond	Clear conditions down to feature of interest associated with threshold accuracy	Over specified geographic area
Total Water Content	Day and night	Quantitative out to at least 62 degrees LZA and qualitative beyond	Only clear regions and optically thin, single layer clouds associated with threshold accuracy	Over specified geographic area
RADIANCES				
Clear Sky Masks	Day and night	Quantitative out to at least 70 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Radiances	Day and night	Quantitative out to at least 70 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
RADIATION				
Absorbed Shortwave Radiation: Surface	Day	Quantitative out to at least 70 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Downward Longwave Radiation: Surface	Day and night	Quantitative out to at least 70 degrees LZA and qualitative beyond	Not applicable	Over specified geographic area

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.



Appendix A Table 2: Product Qualifiers				
Observational Requirements	Temporal Coverage Qualifiers (Threshold)	Product Extent Qualifier (Threshold)	Cloud Cover Conditions Qualifier (Threshold)	Product Statistics Qualifier (Threshold)
Downward Solar Insolation: Surface	Day for SZA values greater than 25 degrees	Quantitative out to at least 70 degrees LZA and qualitative beyond	Not applicable	Over specified geographic area
Reflected Solar Insolation: TOA	Day	Quantitative out to at least 70 degrees LZA	Clear conditions associated with threshold accuracy	Over specified geographic area
Upward Longwave Radiation: Surface	Day and night	Quantitative out to at least 62 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Upward Longwave Radiation: TOA	Day and night	Quantitative out to at least 62 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
TRACE GASES				
Ozone Total	Day and night	Quantitative out to at least 65 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
SO2 Detection	Day and night	Quantitative out to at least 70 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
WINDS				
Derived Motion Winds	Day and night	Quantitative out to at least 62 degrees LZA and qualitative beyond	Clear conditions down to feature of interest associated with threshold accuracy	Over specified geographic area
Observational Requirements: LAND				
Fire / Hot Spot Characterization:	Day and night	Quantitative out to at least 65 degrees LZA and qualitative beyond	If feature is obscured by thick clouds, product will not meet threshold measurement accuracy	Over specified geographic area
Flood/Standing Water	Day with Sun at 67 degree solar zenith angle	Quantitative out to at least 67 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Ice Cover/ Landlocked	Day with Sun at 67 degree solar zenith angle	Quantitative out to at least 67 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Land Surface (Skin) Temperature	Day and night	Quantitative out to at least 70 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Snow Cover	Sun at 67 degree daytime solar zenith angle	Quantitative out to at least 55 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Snow Depth	Sun at 67 degree daytime solar zenith angle	Quantitative out to at least 70 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Surface Albedo	Sun at 67 degree daytime solar zenith angle	Quantitative out to at least 70 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Surface Emissivity	Sun at 67 degree daytime solar zenith angle	Quantitative out to at least 70 degrees LZA	Clear conditions associated with threshold accuracy	Over specified geographic area
Vegetation Fraction: Green	Sun at 67 degree daytime solar zenith angle	Quantitative out to at least 55 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Vegetation Index	Sun at 67 degree daytime solar zenith angle	Quantitative out to at least 70 degrees LZA and qualitative beyond	Clear conditions associated with threshold accuracy	Over specified geographic area
Observational Requirements: OCEAN				
Currents	Day and night	Quantitative out to at least 67 degrees LZA and qualitative at larger LZA	Clear conditions associated with threshold accuracy	Over specified geographic area
Currents: Offshore	Day and night	Quantitative out to at least 67 degrees LZA and qualitative at larger LZA	Clear conditions associated with threshold accuracy	Over specified geographic area
Sea & Lake Ice: Age	Sun out to 67 degree daytime solar zenith angle	Quantitative out to at least 67 degrees LZA and qualitative at larger LZA	Clear conditions associated with threshold accuracy	Over specified geographic area

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 2: Product Qualifiers				
Observational Requirements	Temporal Coverage Qualifiers (Threshold)	Product Extent Qualifier (Threshold)	Cloud Cover Conditions Qualifier (Threshold)	Product Statistics Qualifier (Threshold)
Sea & Lake Ice: Concentration	Sun out to 67 degree daytime solar zenith angle	Quantitative out to at least 67 degrees LZA and qualitative at larger LZA	Clear conditions associated with threshold accuracy	Over specified geographic area
Sea & Lake Ice: Extent	Sun out to 67 degree daytime solar zenith angle	Quantitative out to at least 67 degrees LZA and qualitative at larger LZA	Clear conditions associated with threshold accuracy	Over specified geographic area
Sea & Lake Ice: Motion	Sun out to 67 degree daytime solar zenith angle	Quantitative out to at least 67 degrees LZA and qualitative at larger LZA	Clear conditions associated with threshold accuracy	Over specified geographic area
Sea Surface Temps	Day and night	Quantitative out to at least 67 degrees LZA and qualitative at larger LZA	Clear conditions associated with threshold accuracy	Over specified geographic area
Observational Requirements: SPACE AND SOLAR				
ENERGETIC PARTICLES				
Energetic Heavy Ions	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Magnetospheric Electrons and Protons: Low Energy	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Magnetospheric Electrons and Protons: Medium & High Energy	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Solar and Galactic Protons	Not Applicable	Not Applicable	Not Applicable	Not Applicable
MAGNETIC FIELD				
Geomagnetic Field	Not Applicable	Not Applicable	Not Applicable	Not Applicable
SOLAR				
Solar Flux: EUV	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Solar Flux: X-Ray	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Solar Imagery: X-Ray	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Appendix A Table 3: Option 2 End-Product Sets and Performance Parameters

Appendix A Table 3: Option 2 End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O2) Mode 3	Vendor Allocated Ground Latency (O2) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Aerosol Particle Size	3	O2	NetCDF McIDAS	2	No	2+	Full Disk	Total Column	2 km	1.0 km	Fine/Coarse Angstrom exponent range:- 1 to +3	Fine/Coarse Angstrom exponent: 0.3 over ocean and land	15 min	5 min	266 sec	266 sec	0.15	Atmosphere	Aerosols
Aircraft Icing Threat	4	O2	NetCDF McIDAS	2	No	2+	Full Disk	Cloud top	10 km	5 km	None, Unknown, Light, Moderate, or Severe	2 categories	60 min	5 min	806 sec	806 sec	50% classification error	Atmosphere	Clouds
Cloud Ice Water Path	3	O2	NetCDF McIDAS	6	No	2+	CONUS: for limited cloudiness & Full Disk: for limited cloudiness & Mesoscale: for limited cloudiness	SFC - 20 km	2 km	1.0 km	0-1 mm (Day)	Greater of 0.1 mm or 30% during the day	CONUS: 5 min & Full Disk: 15 min & Mesoscale: 5 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 50 sec & Full Disk: 159 sec & Mesoscale: 50 sec	CONUS: 50 sec & Full Disk: 159 sec	30%	Atmosphere	Clouds
Cloud Imagery: Coastal	3	O2	NetCDF McIDAS	2	No	2+	Coastal: US navigable waters thru EEZ	Not Applicable	Day: 1 km; Night: 2 km	< = 1 km	Not Applicable	Not Applicable	180 min	5 min	Coastal: 806 sec	Coastal: 806 sec	N/A	Atmosphere	Clouds
Cloud Layers / Heights and Thickness	3	O2	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	1 cloud layer	CONUS: 10 km & Full Disk: 10 km & Mesoscale: 4 km	CONUS: 5 km, - Full Disk: 5 km, - Mesoscale: 2 km	Thickness: only by general cloud type. Heights of up to 1 layers	Thickness: 70% correct typing Height: By general cloud type	CONUS: 60 min & Full Disk: 60 min & Mesoscale: 5 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 806 sec & Full Disk: 806 sec & Mesoscale: 266 sec	CONUS: 806 sec & Full Disk: 806 sec	Thickness: 50% in thickness; Heights: 30% in height	Atmosphere	Clouds
Cloud Liquid Water	3	O2	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Total Column	2 km	1.0 km	0 - 1 mm	Day: Greater of 0.1 mm or 30%	CONUS: 5 min & Full Disk: 30 min & Mesoscale: 5 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 266 sec & Full Disk: 159 sec & Mesoscale: 266 sec	CONUS: 266 sec & Full Disk: 159 sec	30%	Atmosphere	Clouds

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 3: Option 2 End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O2) Mode 3	Vendor Allocated Ground Latency (O2) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Cloud Type	3	O2	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Not Applicable	CONUS: 10 km & Full Disk: 2 km & Mesoscale: 2 km	CONUS: 5 km-Full Disk: 1 km-Mesoscale: 1 km	7 types	Probability of correct typing of 60%	CONUS: 15 min & Full Disk: 15 min & Mesoscale: 15 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 536 sec & Full Disk: 159 sec & Mesoscale: 266 sec	CONUS: 536 sec & Full Disk: 159 sec	20%	Atmosphere	Clouds
Convective Initiation	3	O2	NetCDF McIDAS	4	No	2+	CONUS & Mesoscale	Not Applicable	2 km	1.0 km	Binary Yes/no detection	70% probability of correct detection	CONUS: 5 min & Mesoscale: 5 min	5 min	CONUS: 159 sec & Mesoscale: 159 sec	CONUS: 159 sec	5%	Atmosphere	Clouds
Enhanced "V" / Overshooting Top Detection	4	O2	NetCDF McIDAS	4	No	2+	CONUS & Mesoscale	Not Applicable	2 km	1.0 km	0 - 1 Binary (160 - 270 K)	10 % Detection Error (1 K Top)	5 min	5 min	CONUS: 159 sec & Mesoscale: 159 sec	CONUS: 159 sec	5%	Atmosphere	Clouds
Low Cloud and Fog	3	O2	NetCDF McIDAS	2	No	2+	Full Disk	0.5 km (depth)	2 km	1.0 km	Fog/No Fog	70% Correct Detection	15 min	5 min	Full Disk: 159 sec	Full Disk: : 159 sec	5%	Atmosphere	Clouds
Turbulence	3	O2	NetCDF McIDAS	4	No	2+	Full Disk & Mesoscale	SFC - 100 mb	2 km	1.0 km	Binary (moderate or greater is detected) above boundary layer	Correct detection 75%	Full Disk: 15 min & Mesoscale: 5 min	Full Disk: 5 min	Full Disk: 159 sec & Mesoscale: 266 sec	Full Disk: 159 sec	50%	Atmosphere	Clouds
Visibility	4	O2	NetCDF McIDAS	2	No	2+	Full Disk	Not Applicable	10 km	5 km	Clear (vis ≥ 30 km)  Moderate (10 km ≤ Vis < 30 km) Low (2 km ≤ vis < 10 km); Poor (vis < 2 km) (under the conditions of clear up through clouds of only layer)	Correct classification 80%	Full Disk: 60 min	Full Disk: 5 min	Full Disk: 806 sec	Full Disk: 806 sec	15%	Atmosphere	Clouds

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 3: Option 2 End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O2) Mode 3	Vendor Allocated Ground Latency (O2) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Probability of Rainfall	4	O2	NetCDF McIDAS	2	No	2+	Full Disk	Not Applicable	2 km	1.0 km	0 to 100%	25%	15 min	5 min	Full Disk: 266 sec	Full Disk: 266 sec	40%	Atmosphere	Precipitation
Rainfall Potential	4	O2	NetCDF McIDAS	2	No	2+	Full Disk	Not Applicable	2 km	1.0 km	0-100 mm/hr	5 mm/hr	15 min	5 min	Full Disk: 266 sec	Full Disk: 266 sec	200% for rain rate > 0	Atmosphere	Precipitation
Total Water Content	3	O2	NetCDF McIDAS	6	No	2+	CONUS: Clear and Above Cloud Regions Only) & Full Disk: Clear and Above Cloud Regions Only & Mesoscale: Clear and Above Cloud Regions Only	SFC - TOA	CONUS: 10 km & Full Disk: 10 km & Mesoscale: 4 km	CONUS: 5 km & Full Disk: 5 km & Mesoscale: 2 km	0 - 100 mm	10% compared to ground based truth	CONUS: 60 min & Full Disk: 60 min & Mesoscale: 5 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 159 sec & Full Disk: 159 sec & Mesoscale: 266 sec	CONUS: 159 sec & Full Disk: 159 sec	3 mm	Atmosphere	Profiles
Absorbed Shortwave Radiation: Surface	3	O2	NetCDF McIDAS	2	No	2+	Mesoscale	Not Applicable	5 km	1.0 km	0 - 1200 W/m2	Low albedo: 60 W/m2 & High albedo: 25 W/m2	60 min	N/A	Mesoscale: 3236 sec	N/A	Low Albedo: 40 W/m2 & High Albedo: 10 W/m2	Atmosphere	Radiation
Downward Longwave Radiation: Surface	3	O2	NetCDF McIDAS	4	No	2+	CONUS & Full Disk	Not Applicable	CONUS: 25 km & Full Disk: 100 km	CONUS: 5 km-Full Disk: 4 km	50 - 750 W/m2	25 W/m2 for known cloud fraction	60 min	5 min	CONUS: 3238 sec & Full Disk: 806 sec	CONUS: 3238 sec & Full Disk: 806 sec	20 W/m2 for known cloud fraction	Atmosphere	Radiation
Upward Longwave Radiation: Surface	3	O2	NetCDF McIDAS	4	No	2+	CONUS & Full Disk	Not Applicable	CONUS: 25 km-Full Disk: 100 km	CONUS: 5 km-Full Disk: 5 km	50-900 W/m2	10 W/m2	60 min	5 min	CONUS: 3236 sec & Full Disk: 3236 sec	CONUS: 3236 sec & Full Disk: 3236 sec	20 W/m2	Atmosphere	Radiation
Upward Longwave Radiation: TOA	3	O2	NetCDF McIDAS	4	No	2+	CONUS & Full Disk	Not Applicable	25 km	5 km	CONUS: 50-450 W/m2 & Full Disk: 50-900 W/m2	20 W/m2	60 min	5 min	CONUS: 3236 sec & Full Disk: 3236 sec	CONUS: 3236 sec & Full Disk: 3236 sec	5 W/m2	Atmosphere	Radiation

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 3: Option 2 End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O2) Mode 3	Vendor Allocated Ground Latency (O2) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Ozone Total	3	O2	NetCDF McIDAS	4	No	2+	CONUS & Full Disk	Total Column	10 km	5 km	100-650 DU (where 1 DU= $2.7 \times 10^{-6}$ mol/cm <sup>2</sup> )	8%	60 min	5 min	CONUS: 266 sec & Full Disk: 266 sec	CONUS: 266 sec & Full Disk: 266 sec	5%	Atmosphere	Trace Gases
SO2 Detection	3	O2	NetCDF McIDAS	2	No	2+	Full Disk	Total Column	5 km	1 km	Binary Yes/No Above 1 to 700 Dobson Units (DU)	10%	60 min	5 min	Full Disk : 806 sec	Full Disk: 806 sec	5%	Atmosphere	Trace Gases
Flood/Standing Water	4	O2	NetCDF McIDAS	4	No	2+	Full Disk & Mesoscale	Not Applicable	10 km	5 km	0 to 100%	Probability of correct classification to 60%	60 min	Full Disk: 60 min	Full Disk 19436 sec & Mesoscale: 19436 sec	Full Disk: 19436 sec	30%	Land	Land
Ice Cover/ Landlocked	4	O2	NetCDF McIDAS	2	No	2+	Full Disk	Not Applicable	2 km	1 km	Binary yes / no detection	Binary yes/no detection	24 hour	24 hour	Full Disk: 77756 sec	Full Disk: 77756 sec	5%	Land	Land
Snow Depth	4	O2	NetCDF McIDAS	6	No	2+	CONUS: Tall Grassy Plains Only & Full Disk: Tall Grassy Plains Only & Mesoscale: Tall Grassy Plains Only	Not Applicable	2 km	1 km	0 to 27 cm	30%	CONUS: 60 min & Full Disk: 60 min & Mesoscale: 60 min	CONUS: 60 min & Full Disk: 60 min	CONUS: 3236 sec & Full Disk: 3236 sec & Mesoscale: 3236 sec	CONUS: 3236 sec & Full Disk: 3236 sec	5%	Land	Land
Surface Albedo	3	O2	NetCDF McIDAS	2	No	2+	Full Disk	Not Applicable	2 km	2 km	0 to 1 Albedo Units	0.08 (albedo units)	60 min	60 min	Full Disk: 3236 sec	Full Disk: 3236 sec	3%	Land	Land
Surface Emissivity	3	O2	NetCDF McIDAS	2	No	2+	CONUS	Not Applicable	10 km	5 km	0.85 to 1.0 (unitless)	0.02	60 min	60 min	CONUS: 3236 sec	CONUS: 3236 sec	0.005	Land	Land
Vegetation Fraction: Green	4	O2	NetCDF McIDAS	2	No	2+	CONUS	Not Applicable	2 km	1 km	0.0 to 1.0 (unitless)	0.05	60 min	60 min	CONUS: 3236 sec	CONUS: 3236 sec	0.05	Land	Land
Vegetation Index	4	O2	NetCDF McIDAS	2	No	2+	CONUS	Not Applicable	2 km	1 km	0 to 1 (NDVI units)	0.04 NDVI Units	60 min	60 min	CONUS: 3236 sec	CONUS: 3236 sec	0.04 NDVI units	Land	Land

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix A Table 3: Option 2 End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O2) Mode 3	Vendor Allocated Ground Latency (O2) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Currents	4	O2	NetCDF McIDAS	4	No	2+	Full Disk & Mesoscale	SFC	2 km	1.0 km	0 to 2 m/s (0 to 7.2 km/hr), 0 to 360 degrees	1 km/hr	6 hr	6 hr	Full Disk: 3236 sec & Mesoscale: 3236 sec	Full Disk: 3236 sec	1 km/hr	Ocean	Ocean
Currents: Offshore	4	O2	NetCDF McIDAS	4	No	2+	CONUS and US navigable waters thru EEZ & Full Disk	SFC	2 km	1 km	0 - 7.2 km/hr	1 km / hr	180 min	180 min	CONUS: 3236 sec & Full Disk: 3236 sec	CONUS: 3236 sec & Full Disk: 3236 sec	1 km/hr	Ocean	Ocean
Sea & Lake Ice: Age	4	O2	NetCDF McIDAS	2	No	2+	Full Disk	Ice Surface	1 km	3 km	Distinguish between ice free areas and first year ice.	85% probability of correct detection	6 hr	6 hr	Full Disk: 3236 sec	Full Disk: 3236 sec	15%	Ocean	Ocean
Sea & Lake Ice: Concentration	4	O2	NetCDF McIDAS	4	No	2+	CONUS: Regional & Great Lakes and US coastal waters containing sea ice hazards to navigation & Full Disk: Sea ice covered waters in N. & S. Hemisphere	Ice Surface	CONUS: 3 km & Full Disk: 10 km	CONUS: < = 1.5 km, - Full Disk: < = 5.0 km	Ice concentration - 0/10 to 10/10	Ice concentration - 10%	CONUS: 180 min & Full Disk: 6 hr	CONUS: 180 min & Full Disk: 6 hr	CONUS: 3236 sec & Full Disk: 9716 sec	CONUS: 3236 sec & Full Disk: 9716 sec	30%	Ocean	Ocean
Sea & Lake Ice: Extent	4	O2	NetCDF McIDAS	2	No	2+	Full Disk	Not Applicable	2 km	1 km	From the 100% ice concentration location at the land edge to the less than 15% ice concentration that is the ice extent	Ice extent: 1km	180 min	180 min	Full Disk: 9716 sec	Full Disk: 9716 sec	50%	Ocean	Ocean

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.



Appendix A Table 3: Option 2 End-Product Sets and Performance Parameters

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O2) Mode 3	Vendor Allocated Ground Latency (O2) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Sea & Lake Ice: Motion	4	O2	NetCDF McIDAS	4	No	2+	CONUS: Great Lakes and Chesapeake and Delaware Bays only & Full Disk: Sea ice covered waters in N. & S. Hemisphere	Not Applicable	CONUS: 5 km & Full Disk: 15 km	CONUS: < = 2.5 km- Full Disk: < = 7.5 km	Direction: 0 to 360° & Displacement: 0 to 0.6 m/s	Direction: +/- 22.5°	CONUS: 3 hr & Full Disk: 6 hr	CONUS: 3 hr & Full Disk: 6 hr	CONUS: 3236 sec & Full Disk: 9716 sec	CONUS: 3236 sec & Full Disk: 9716 sec	50%	Ocean	Ocean

Appendix B: OSD-Allocated Ground Latency for GOES-R Access Subsystem

Appendix B: OSD-Allocated Ground Latency for GOES-R Access Subsystem	
Name	GAS Allocated Ground Latency
Aerosol Detection (including Smoke and Dust)	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Aerosol Particle Size	Full Disk: 1 sec
Suspended Matter / Optical Depth	CONUS: 1 sec Full Disk: 1 sec
Volcanic Ash: Detection and Height	Full Disk: 1 sec
Aircraft Icing Threat	Full Disk: 1 sec
Cloud Ice Water Path	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Cloud Imagery: Coastal	Coastal: 1 sec
Cloud Layers / Heights and Thickness	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Cloud Liquid Water	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Cloud & Moisture Imagery	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Cloud Optical Depth	CONUS: 1 sec Full Disk: 1 sec
Cloud Particle Size Distribution	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Cloud Top Phase	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Cloud Top Height	CONUS: 1 sec, Full Disk: 1 sec Mesoscale: 1 sec

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix B: OSD-Allocated Ground Latency for GOES-R Access Subsystem	
Name	GAS Allocated Ground Latency
Cloud Top Pressure	CONUS: 1 sec, Full Disk: 1 sec
Cloud Top Temperature	Full Disk: 1 sec Mesoscale: 1 sec
Cloud Type	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Convective Initiation	CONUS: 1 sec Mesoscale: 1 sec
Enhanced "V" / Overshooting Top Detection	CONUS: 1 sec Mesoscale: 1 sec
Hurricane Intensity	Full Disk: 1 sec
Lightning Detection: 1) Events and 2)Flashes	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Low Cloud and Fog	Full Disk: 1 sec
Turbulence	Full Disk: 1 sec Mesoscale: 1 sec
Visibility	Full Disk: 1 sec
Probability of Rainfall	Full Disk: 1 sec
Rainfall Potential	Full Disk: 1 sec
Rainfall Rate/QPE	Full Disk: 1 sec
Legacy Vertical Moisture Profile	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Legacy Vertical Temperature Profile	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Derived Stability Indices (5 indices: CAPE, Lifted Index, K-index, Showalter Index, Total Totals)	CONUS: 1 sec Mesoscale: 1 sec
Total Precipitable Water	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Total Water Content	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix B: OSD-Allocated Ground Latency for GOES-R Access Subsystem	
Name	GAS Allocated Ground Latency
Clear Sky Masks	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Radiances	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Absorbed Shortwave Radiation: Surface	Mesoscale: 1 sec
Downward Longwave Radiation: Surface	CONUS: 1 sec Full Disk: 1 sec
Downward Solar Insolation: Surface	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Reflected Solar Insolation: TOA	CONUS: 1 sec Full Disk: 1 sec
Upward Longwave Radiation: Surface	CONUS: 1 sec Full Disk: 1 sec
Upward Longwave Radiation: TOA	CONUS: 1 sec Full Disk: 1 sec
Ozone Total	CONUS: 1 sec Full Disk: 1 sec
SO2 Detection	Full Disk: 1 sec
Derived Motion Winds	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Fire / Hot Spot Characterization:	CONUS: 1 sec Full Disk: 1 sec
Flood/Standing Water	Full Disk: 1 sec Mesoscale: 1 sec
Ice Cover/ Landlocked	Full Disk: 1 sec
Land Surface (Skin) Temperature	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Snow Cover	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix B: OSD-Allocated Ground Latency for GOES-R Access Subsystem	
Name	GAS Allocated Ground Latency
Snow Depth	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Surface Albedo	Full Disk: 1 sec
Surface Emissivity	CONUS: 1 sec
Vegetation Fraction: Green	CONUS: 1 sec
Vegetation Index	CONUS: 1 sec
Currents	Full Disk: 1 sec Mesoscale: 1 sec
Currents: Offshore	CONUS: 1 sec Full Disk: 1 sec
Sea & Lake Ice: Age	Full Disk: 1 sec
Sea & Lake Ice: Concentration	CONUS: 1 sec Full Disk: 1 sec
Sea & Lake Ice: Extent	Full Disk: 1 sec
Sea & Lake Ice: Motion	CONUS: 1 sec Full Disk: 1 sec
Sea Surface Temps	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Energetic Heavy Ions	N/A
Magnetospheric Electrons and Protons: Low Energy	N/A
Magnetospheric Electrons and Protons: Medium & High Energy	N/A
Solar and Galactic Protons	N/A
Geomagnetic Field	N/A
Solar Flux: EUV	N/A
Solar Flux: X-Ray	N/A
Solar Imagery: X-Ray	N/A

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix C: OSD Allocated Ground Latency for Antennas

Appendix C: OSD Allocated Ground Latency for Antennas	
Name	Antenna Ground Latency
Aerosol Detection (including Smoke and Dust)	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Aerosol Particle Size	Full Disk: 1 sec
Suspended Matter / Optical Depth	CONUS: 1 sec Full Disk: 1 sec
Volcanic Ash: Detection and Height	Full Disk: 1 sec
Aircraft Icing Threat	Full Disk: 1 sec
Cloud Ice Water Path	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Cloud Imagery: Coastal	Coastal: 1 sec
Cloud Layers / Heights and Thickness	CONUS: 1 sec Full Disk: 1 sec; Mesoscale: 1 sec
Cloud Liquid Water	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Cloud & Moisture Imagery	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Cloud Optical Depth	CONUS: 1 sec Full Disk: 1 sec
Cloud Particle Size Distribution	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Cloud Top Phase	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Cloud Top Height	CONUS: 1 sec, Full Disk: 1 sec Mesoscale: 1 sec
Cloud Top Pressure	CONUS: 1 sec, Full Disk: 1 sec

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix C: OSD Allocated Ground Latency for Antennas	
Name	Antenna Ground Latency
Cloud Top Temperature	Full Disk: 1 sec Mesoscale: 1 sec
Cloud Type	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Convective Initiation	CONUS: 1 sec Mesoscale: 1 sec
Enhanced "V" / Overshooting Top Detection	CONUS: 1 sec Mesoscale: 1 sec
Hurricane Intensity	Full Disk: 1 sec
Lightning Detection: 1) Events and 2)Flashes	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Low Cloud and Fog	Full Disk: 1 sec
Turbulence	Full Disk: 1 sec Mesoscale: 1 sec
Visibility	Full Disk: 1 sec
Probability of Rainfall	Full Disk: 1 sec
Rainfall Potential	Full Disk: 1 sec
Rainfall Rate/QPE	Full Disk: 1 sec
Legacy Vertical Moisture Profile	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Legacy Vertical Temperature Profile	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Derived Stability Indices (5 indices: CAPE, Lifted Index, K-index, Showalter Index, Total Totals)	CONUS: 1 sec Mesoscale: 1 sec
Total Precipitable Water	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Total Water Content	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec



Appendix C: OSD Allocated Ground Latency for Antennas	
Name	Antenna Ground Latency
Clear Sky Masks	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Radiances	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Absorbed Shortwave Radiation: Surface	Mesoscale: 1 sec
Downward Longwave Radiation: Surface	CONUS: 1 sec Full Disk: 1 sec
Downward Solar Insolation: Surface	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Reflected Solar Insolation: TOA	CONUS: 1 sec Full Disk: 1 sec
Upward Longwave Radiation: Surface	CONUS: 1 sec Full Disk: 1 sec
Upward Longwave Radiation: TOA	CONUS: 1 sec Full Disk: 1 sec
Ozone Total	CONUS: 1 sec Full Disk: 1 sec
SO2 Detection	Full Disk: 1 sec
Derived Motion Winds	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Fire / Hot Spot Characterization:	CONUS: 1 sec Full Disk: 1 sec
Flood/Standing Water	Full Disk: 1 sec Mesoscale: 1 sec
Ice Cover/ Landlocked	Full Disk: 1 sec
Land Surface (Skin) Temperature	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Snow Cover	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix C: OSD Allocated Ground Latency for Antennas	
Name	Antenna Ground Latency
Snow Depth	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Surface Albedo	Full Disk: 1 sec
Surface Emissivity	CONUS: 1 sec
Vegetation Fraction: Green	CONUS: 1 sec
Vegetation Index	CONUS: 1 sec
Currents	Full Disk: 1 sec Mesoscale: 1 sec
Currents: Offshore	CONUS: 1 sec Full Disk: 1 sec
Sea & Lake Ice: Age	Full Disk: 1 sec
Sea & Lake Ice: Concentration	CONUS: 1 sec Full Disk: 1 sec
Sea & Lake Ice: Extent	1 sec
Sea & Lake Ice: Motion	CONUS: 1 sec Full Disk: 1 sec
Sea Surface Temps	CONUS: 1 sec Full Disk: 1 sec Mesoscale: 1 sec
Energetic Heavy Ions	1 sec
Magnetospheric Electrons and Protons: Low Energy	1 sec
Magnetospheric Electrons and Protons: Medium & High Energy	1 sec
Solar and Galactic Protons	1 sec
Geomagnetic Field	1 sec
Solar Flux: EUV	1 sec
Solar Flux: X-Ray	1 sec
Solar Imagery: X-Ray	1 sec

Appendix D: Improved Latencies and Refresh Rates for Product Sets 1 and 2 (Option 1)

Appendix D: Improved Latencies and Refresh Rates for Product Sets 1 and 2 (Option 1)																			
Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O1) Mode 3	Vendor Allocated Ground Latency (O1) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Aerosol Detection (including Smoke and Dust)	1	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Total Column	2 km	1 km	Binary yes/no detection above threshold 0.2 (for aerosol optical thickness)	20% classification error	15 min	5 min	CONUS: 806 sec Full Disk: 159 sec Mesoscale: 806 sec	CONUS: 806 sec Full Disk: 159 sec	10%	Atmosphere	Aerosols
Suspended Matter / Optical Depth	1	B	NetCDF McIDAS	4	No	2+	CONUS & Full Disk	Total Column	2 km	1.0 km	0.04-3.0 in optical depth (retain negative retrievals)	20% classification error over land, 10% classification error over ocean; 30% error in optical depth	CONUS: 5 min & Full Disk: 15 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 50 sec Full Disk: 159 sec	CONUS: 50 sec Full Disk: 159 sec	13%	Atmosphere	Aerosols
Volcanic Ash: Detection and Height	2	B	NetCDF McIDAS	2	No	2+	Full Disk	3 km (top height)	2 km	1.0 km	0-50 tons/km2	2 ton/km2	15 min	5 min	Full Disk: 50 sec	Full Disk: 50 sec	10%	Atmosphere	Aerosols
Cloud & Moisture Imagery	1	B	NetCDF McIDAS	54	Yes	2+	CONUS & Full Disk & Mesoscale	Not Applicable	2 km, with finer daytime observations	1.0 km	Not Applicable	Not Applicable	CONUS: 5 min & Full Disk: 15 min & Mesoscale: 30 sec	CONUS: 5 min & Full Disk: 5 min	CONUS: 50 sec Full Disk: 50 sec Mesoscale: 23 sec	CONUS: 50 sec Full Disk: 50 sec	N/A	Atmosphere	Clouds
Cloud Optical Depth	1	B	NetCDF McIDAS	4	No	2+	CONUS: for optical depth > 1 & Full Disk: for optical depth > 1	Total column	CONUS: 2 km & Full Disk: 4 km	CONUS: 1 km-Full Disk: 2 km	0.5 - 50	20%	CONUS: 15 min & Full Disk: 15 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 806 sec Full Disk: 159 sec	CONUS: 806 sec Full Disk: 159 sec	10%	Atmosphere	Clouds

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix D: Improved Latencies and Refresh Rates for Product Sets 1 and 2 (Option 1)

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O1) Mode 3	Vendor Allocated Ground Latency (O1) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Cloud Particle Size Distribution	1	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Cloud Top	2 km	1.0 km	0 - 50 µm	4 µm for liquid phase, 10 µm for ice phase	CONUS: 5 min, & Full Disk: 15 min & Mesoscale: 5 min	CONUS: 5 min, & Full Disk: 5 min	CONUS: 50 sec Full Disk: 806 sec Mesoscale: 266 sec	CONUS: 50 sec Full Disk: 266 sec	2 um	Atmosphere	Clouds
Cloud Top Phase	1	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Cloud Top	2 km	1.0 km	Liquid /solid / supercooled / mixed	20% classification error	CONUS: 5 min & Full Disk: 15 min & Mesoscale: 5 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 50 sec Full Disk: 159 sec Mesoscale: 50 sec	CONUS: 50 sec Full Disk: 159 sec	20%	Atmosphere	Clouds
Cloud Top Height	1	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Cloud top	CONUS: 10 km & Full Disk: 10 km & Mesoscale: 4 km	CONUS: 5 km-Full Disk: 5 km-Mesoscale: 2 km	CONUS: 100m - 300hPa & Full Disk: 0 - 15 km & Mesoscale: 0 - 20 km	500 m for low level clouds with emissivity > 0.5	CONUS: 60 min, & Full Disk: 60 min & Mesoscale: 5 min	CONUS: 5 min, & Full Disk: 5 min	CONUS: 159 sec, Full Disk: 159 sec Mesoscale: 266 sec	CONUS: 159 sec, Full Disk: 159 sec	1.3 km	Atmosphere	Clouds
Cloud Top Pressure	1	B	NetCDF McIDAS	4	No	2+	CONUS & Full Disk	Cloud top	10 km	5 km	CONUS: 100- 1000 hPa Full Disk: 100 - 1000 mb	100 mb for low level clouds with emissivity > 0.5	60 min	5 min	CONUS: 536 sec, Full Disk: 159 sec	CONUS: 536 sec, Full Disk: 159 sec	10 mb	Atmosphere	Clouds
Cloud Top Temperature	1	B	NetCDF McIDAS	4	No	2+	Full Disk & Mesoscale	At Cloud Tops	2 km	1.0 km	180-300 K	1.0 K for known emissivity = 1.0 and known atmosphere and low clouds; 4 K for low level cloud emissivity > 0.5	Full Disk: 15 min & Mesoscale: 5 min	Full Disk: 5 min	Full Disk: 159 sec Mesoscale: 266 sec	Full Disk: 159 sec	1 K	Atmosphere	Clouds

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix D: Improved Latencies and Refresh Rates for Product Sets 1 and 2 (Option 1)																			
Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O1) Mode 3	Vendor Allocated Ground Latency (O1) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Hurricane Intensity	2	B	NetCDF McIDAS	2	No	2+	Full Disk	Not Applicable	2 km	1.0 km	Dvorak hurricane intensity scale values of 4 - 8 or leading to wind speeds of 33.4 m/s (65 knots) to 87.5 m/s (170 knots)	5 m/s over ocean	30 min	5 min	Full Disk: 159 sec	Full Disk: 159 sec	5 m/s over the ocean	Atmosphere	Clouds
Lightning Detection: 1) Events and 2)Flashes	1	B	NetCDF McIDAS	12	Yes	2+	CONUS & Full Disk & Mesoscale	Surface to cloud top	10 km	5 km	Real time	70% total strikes detection	continuous	continuous	CONUS: 50 sec Full Disk: 50 sec Mesoscale: 50 sec	CONUS: 50 sec Full Disk: 50 sec	5%	Atmosphere	Clouds
Rainfall Rate/QPE	2	B	NetCDF McIDAS	2	No	2+	Full Disk	Not Applicable	2 km	1.0 km	0-100 mm/hr	2 mm/hr at 30 mm/hr rate, with higher values at higher rates	15 min	5 min	Full Disk: 50 sec	Full Disk: 50 sec	2 mm/hr at 30 mm/hr rate, with higher values at higher rates	Atmosphere	Precipitation

Appendix D: Improved Latencies and Refresh Rates for Product Sets 1 and 2 (Option 1)

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O1) Mode 3	Vendor Allocated Ground Latency (O1) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Legacy Vertical Moisture Profile	1	B	NetCDF McIDAS	6	No	2+	CONUS - Clear and Above Cloud Regions only & Full Disk - Clear and Above Cloud Regions only & Mesoscale - Clear and Above Cloud Regions only	Reflects layering of Numerical Weather Prediction Models; inherent vertical resolution is only 3 to 5 km	10 km	5 km	0 - 100%	Sfc-500 mb: 18 % relative humidity & 500-300 mb: 18% relative humidity & 300-100 mb: 20% relative humidity	Full Disk : 60 min & CONUS: 30 min & Mesoscale: 5 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 266 sec & Full Disk: 266 sec & Mesoscale: 266 sec	CONUS: 266 sec & Full Disk: 266 sec	Sfc-500 mb: 18 % relative humidity 500-300 mb: 18% relative humidity 300-100 mb: 20% relative humidity	Atmosphere	Profiles
Legacy Vertical Temperature Profile	1	B	NetCDF McIDAS	6	No	2+	CONUS - Clear and Above Cloud Regions only & Full Disk - Clear and Above Cloud Regions only & Mesoscale - Clear and Above Cloud Regions only	Reflects layering of Numerical Weather Prediction Models; inherent vertical resolution is only 3 to 5 km	10 km	5 km	180 - 320 K	0.1 K improvement over numerical weather prediction model analysis	Full Disk : 60 min & CONUS: 30 min & Mesoscale: 5 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 266 sec & Full Disk: 266 sec & Mesoscale: 266 sec	CONUS: 266 sec & Full Disk: 266 sec	0.1 K improvement over numerical weather prediction model analysis	Atmosphere	Profiles

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix D: Improved Latencies and Refresh Rates for Product Sets 1 and 2 (Option 1)																			
Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O1) Mode 3	Vendor Allocated Ground Latency (O1) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Derived Stability Indices (5 indices: CAPE, Lifted Index, K-index, Showalter Index, Total Totals)	2	B	NetCDF McIDAS	30	No	2+	CONUS & Mesoscale	Not Applicable	CONUS: 4 km & Mesoscale: 4 km	2 km	Lifted Index: -- 10 to 40 K & CAPE: 0 to 5000 J/kg & Showalter index: >4 to - 10 K & Total totals Index: - 43 to > 56 & K index: 0 to 40	Lifted Index: +/- 2.0 K & CAPE: 1000 J/ kg & Showalter index: +/- 2 K & Total totals Index: +/-1 & K index: +/- 2	CONUS: 30 min & Mesoscale: 5 min	CONUS: 5 min	CONUS: 159 sec & Mesoscale: 266 sec	CONUS: 159 sec	Lifted Index: +/- 6.5 K & CAPE: 2500 J/ kg & Showalter index: +/- 6.5 K & Total totals Index: +/-4 K & K index: +/- 5 K	Atmosphere	Profiles
Total Precipitable Water	1	B	NetCDF McIDAS	6	No	2+	CONUS: Clear and Above Cloud Regions Only & Full Disk: Clear and Above Cloud Regions Only & Mesoscale: Clear and Above Cloud Regions Only	Not Applicable	10 km	2 km	0 - 100 mm	10% compared to ground based truth	CONUS: 30 min & Full Disk: 60 min & Mesoscale: 5 min	CONUS: 5 min & Full Disk: 15 min	CONUS: 266 sec & Full Disk: 806 sec & Mesoscale: 266 sec	CONUS: 266 sec & Full Disk: 806 sec	3 mm	Atmosphere	Profiles
Clear Sky Masks	1	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Not Applicable	2 km	1 km	0 - 1 Binary	13% probability of incorrect detection	CONUS: 15 min & Full Disk: 15 min & Mesoscale: 5 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 266 sec Full Disk: 806 sec Mesoscale: 266 sec	CONUS: 266 sec Full Disk: 806 sec	10%	Atmosphere	Radiances

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.



Appendix D: Improved Latencies and Refresh Rates for Product Sets 1 and 2 (Option 1)

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O1) Mode 3	Vendor Allocated Ground Latency (O1) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Radiances	1	B	NetCDF McIDAS	6	Yes	1b	CONUS: Clear and Cloud Regions only & Full Disk: Clear and Cloud Regions only & Mesoscale: Clear and Cloud Regions only	Not Applicable	Individual channel resolutions (0.5 km, 1.0 km, and 2.0 km)	One half of individual channel resolutions (0.5 km, 1.0 km, and 2.0 km)	180K-320K when converted to brightness temperature units	1.0 K when converted to in brightness temperature units for known emissivity	CONUS: 15 min & Full Disk: 15 min & Mesoscale: 5 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 266 sec & Full Disk: 806 sec & Mesoscale: 266 sec	CONUS: 266 sec & Full Disk: 806 sec	0.4 K when converted to in brightness temperature units for known emissivity	Atmosphere	Radiances
Downward Solar Insolation: Surface	2	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Not Applicable	CONUS: 25 km & Full Disk: 50 km & Mesoscale: 5 km	CONUS: 2 km-Full Disk: 4 km-Mesoscale: 1 km	0-1500 W/m2	+/- 60 W/m2 at high end of range for known cloud fraction (1500 W/m2) & +/- 40 W/m2 at typical value/ mid-point for known cloud fraction ( 350 W/m2)	60 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 3236 sec Full Disk: 3236 sec Mesoscale: 3236 sec	CONUS: 3236 sec Full Disk: 3236 sec	30 W/m2 for known cloud fraction	Atmosphere	Radiation

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix D: Improved Latencies and Refresh Rates for Product Sets 1 and 2 (Option 1)																			
Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O1) Mode 3	Vendor Allocated Ground Latency (O1) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Reflected Solar Insolation: TOA	2	B	NetCDF McIDAS	4	No	2+	CONUS & Full Disk	Not Applicable	CONUS: 25 km & Full Disk: 100 km	CONUS: 2 km-Full Disk: 4 km	0-1300 W/m2	CONUS: +/- 60 W/m2 at high end of range (1300 W/m2) +/- 40 W/m2 at typical value/mid-point (350 W/m2) & Full Disk: +/- 60 W/m2 at high end of range (1500 W/m2) +/- 40 W/m2 at typical value/mid-point (350 W/m2)	60 min	5 min	CONUS: 3236 sec Full Disk: 3236 sec	CONUS: 3236 sec Full Disk: 3236 sec	15 W/m2	Atmosphere	Radiation

Appendix D: Improved Latencies and Refresh Rates for Product Sets 1 and 2 (Option 1)

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O1) Mode 3	Vendor Allocated Ground Latency (O1) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Derived Motion Winds	2	B	NetCDF McIDAS	36	No	2+	CONUS & Full Disk & Mesoscale	Cloud Motion Vector winds: At cloud tops; Clear-Sky Water Vapor winds: 200 mb	10 km	5 km	Speed: 0-300 kts (0 to 155 m/s) & Direction: 0 to 360 degrees	Speed: 6 m/s & Direction: < 20 degrees	CONUS: 15 min (based on 3 sequential images 5 minutes apart) & Full Disk: 60 min (based single set of 3 sequential images 5 minutes apart) & Mesoscale : 15 min (based on 3 sequential 5 minute images of the same area)	CONUS: 5 min & Full Disk: 5 min	CONUS: 159 sec & Full Disk: 159 sec & Mesoscale: 159 sec	CONUS: 159 sec & Full Disk: 159 sec	2 m/sec	Atmosphere	Winds
Fire / Hot Spot Characterization:	2	B	NetCDF McIDAS	8	No	2+	CONUS & Full Disk	Not Applicable	2 km	1.0 km	275 to 400 K	2.0 K within dynamic range	CONUS: 5 min & Full Disk: 15 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 266 sec & Full Disk: 266 sec	CONUS: 266 sec & Full Disk: 266 sec	2.0 K	Land	Land

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix D: Improved Latencies and Refresh Rates for Product Sets 1 and 2 (Option 1)

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O1) Mode 3	Vendor Allocated Ground Latency (O1) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Land Surface (Skin) Temperature	2	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Not Applicable	CONUS: 2 km & Full Disk: 10 km & Mesoscale: 2 km	CONUS: 1 km-Full Disk: 5 km-Mesoscale: 1 km	CONUS: 233-333 K Full Disk: 230-330 K Mesoscale: 213-333 K	2.5 K with known emissivity, known atmospheric correction, and 80% channel correlation; 5 K otherwise	60 min	60 min	CONUS: 3236 sec Full Disk: 159 sec Mesoscale: 159 sec	CONUS: 3236 sec Full Disk: 159 sec	2.3 K	Land	Land
Snow Cover	2	B	NetCDF McIDAS	6	No	2+	CONUS & Full Disk & Mesoscale	Not Applicable	2 km	1.0 km	Binary yes / no detection	30%	60 min	60 min	CONUS: 3236 sec & Full Disk: 3236 sec & Mesoscale: 3226 sec	CONUS: 3236 sec & Full Disk: 3236 sec	5%	Land	Land
Sea Surface Temps	2	B	NetCDF McIDAS	6	No	2+	CONUS and US navigable waters thru EEZ & Full Disk & Mesoscale	Not Applicable	2 km	1.0 km	CONUS: 270 to 313 K Full Disk: 271-313 K Mesoscale: 270-313 K	2.1 K with known emissivity, known atmospheric correction, and 80% channel correlation; 3.1 K otherwise	CONUS: 60 min & Full Disk: 60 min & Mesoscale: 60 min	CONUS: 5 min & Full Disk: 5 min	CONUS: 806 sec Full Disk: 806 sec Mesoscale: 806 sec	CONUS: 806 sec Full Disk: 806 sec	1.0 K	Ocean	Ocean
Energetic Heavy Ions	1	B	NetCDF	1	Yes	1b	1 direction	Not Applicable	Not Applicable	Not Applicable	10 to 200 MeV/n-4 mass groups: He, (C,N,O), Ne-S, & Fe	25%	5 min	5 min	267 sec	267 sec	Flux values associated with 10 counts above background in 5-min interval.	Space & Solar	Energetic Particles

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix D: Improved Latencies and Refresh Rates for Product Sets 1 and 2 (Option 1)

Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O1) Mode 3	Vendor Allocated Ground Latency (O1) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Magnetospheric Electrons and Protons: Low Energy	1	B	NetCDF	1	Yes	1b	5 directions	Not Applicable	Not Applicable	Not Applicable	Electron and Protons: 30 eV to 30 keV	25%	30 sec	30 sec	51 sec	51 sec	Flux values associated with 10 counts above background in 5-min interval.	Space & Solar	Energetic Particles
Magnetospheric Electrons and Protons: Medium & High Energy	1	B	NetCDF	1	Yes	1b	5 directions	Not Applicable	Not Applicable	Not Applicable	Electrons: 30 keV to 4 MeV Protons: 30 keV to 1 MeV	25%	30 sec	30 sec	51 sec	51 sec	Flux values associated with 10 counts above background in 5-min interval.	Space & Solar	Energetic Particles
Solar and Galactic Protons	1	B	NetCDF	1	Yes	1b	2 directions	Not Applicable	Not Applicable	Not Applicable	1 MeV to 500 MeV & Differential Measurements	25%	1 min	1 min	51 sec	51 sec	Flux values associated with 10 counts above background in 5-min interval.	Space & Solar	Energetic Particles
Geomagnetic Field	1	B	NetCDF	1	Yes	1b	3-axis 0.5°	Not Applicable	+/- 0.25°	+/- 1°	> = +/- 512 nT/axis (3-axis vector)	1.0 nT (per axis)	2 samples per sec	8 samples per sec	1.8 sec	1.8 sec	0.016 nT	Space & Solar	Magnetic Field
Solar Flux: EUV	1	B	NetCDF	1	Yes	1b	Solar Disk (40 arcmin)	Not Applicable	Not Applicable	+/-2 arcmin	0.5x Sol Min , 10x Sol Max	20%	30 sec	30 sec	24 sec	24 sec	2%	Space & Solar	Solar
Solar Flux: X-Ray	1	B	NetCDF	1	Yes	1b	Solar Disk (40 arcmin)	Not Applicable	Not Applicable	+/-2 arcmin	XRSA: 5x10-9 to 5x10-4 W/m2 XRSB: 2x10-8 to 2x10-3 W/m2	+/- 20%	3 sec	3 sec	1.8 sec	1.8 sec	2%	Space & Solar	Solar

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix D: Improved Latencies and Refresh Rates for Product Sets 1 and 2 (Option 1)																			
Name	Product Set Number	Product Baseline or Product Option (1 or 2)	Output Format for each Coverage	Number of End-Products	RBU Product	Product Level	Product Geographic Coverage (Product Orthogonality/Coverage for Space Weather)	Product Vertical Resolution (Product Horizontal / Angular Resolution for Space Weather)	Product Horizontal Resolution (Product Pointing/ Mapping Accuracy for Space Weather)	Product Mapping Accuracy (Product Pointing Knowledge / Mapping Uncertainty for Space Weather)	Product Measurement Range	Product Measurement Accuracy	Refresh Rate / Coverage Time Option (Mode 3)	Refresh Rate Option (Mode 4)	Vendor Allocated Ground Latency (O1) Mode 3	Vendor Allocated Ground Latency (O1) Mode 4	Product Measurement Precision	Product Type	Product Sub-type
Solar Imagery: X-Ray	1	B	NetCDF FITS	2	Yes	1b	0.0-1.3 Solar Radii	7.0 arcsec	Stability during 24 hours: 1.0 arcmin of sun center (N-S, E-W) (1 sigma)- 3.0 arcmin of sun center (N-S, E-W) (3 sigma) & Stability during 60 seconds: 2.0 arc seconds of sun center (E-W, N-S) (1 sigma)- 6.0 arcsec of sun center (E-W, N-S) (3 sigma)	+/-2.5 arcsec	Radiance: 0.3-10^6 ph/cm2/arcsec/sec & Temperature: 1 to 10 MK	+/-40% in radiance	Image: <2 min & Temp: < 6 min	Image: <2 min & Temp: < 6 min	<50 sec	<50 sec	+/-40% in radiance	Space & Solar	Solar

NOTE: There are 54 KPP Cloud and Moisture Imagery End-Products (48 single band End-Products in NETCDF format at the resolution native to each band and one multiband product at 2 km resolution in both NETCDF & McIDAS Area file formats). This number is arrived at as follows:

Single band products: 16 products \* 1 format (NETCDF) \* 3 coverage areas (Full Disk, CONUS, Mesoscale)

Multiband products: 1 product \* 2 formats (NETCDF and McIDAS Area)\* 3 coverage areas (Full Disk, CONUS, Mesoscale) (CCR01313, CCR01368)

NOTE: The number of Derived Motion Winds End-Products is derived from 6 unique outputs multiplied by 3 coverage areas in two formats each.

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

Appendix E: AWIPS Sectorized Product Set Characteristics

Appendix E: AWIPS Sectorized Product Set Characteristics									
Sectorized Product ID	Satellite Orbital Slot	Sector	Map Projection	Refresh (Full Disk: Mode 3: 15 Min Mode 4: 5 Min) (minutes)	Resolution (km)	ABI Bands Used (central wavelength, micrometer)	Corner Points For Full Disk- Based on +/- E/W 70 degrees from station longitude For Alaska Region - Current Reference longitude at 150W	Bit Depth	Latency (s)
1	GOES EAST	East CONUS	Lambert Conformal	5	0.5	0.64	See ABI Performance and Operational Requirements Document, 417-ABIPORD-0017	8 (TBR)	50.0
2	GOES EAST	East CONUS	Lambert Conformal	5	1	0.47, 0.865, 1.61	See ABI Performance and Operational Requirements Document, 417-ABIPORD-0017	8 (TBR)	50.0
3	GOES EAST	East CONUS	Lambert Conformal	5	2	1.378, 2.25, 3.90, 6.19, 6.95 7.34, 8.5, 9.61, 10.35, 11.2, 12.3, 13.3	See ABI Performance and Operational Requirements Document, 417-ABIPORD-0017	8 (TBR)	50.0
4	GOES EAST	Mesoscale (Flexible 1000 x 1000 km)	Lambert Conformal	0.5	0.5	0.64	N/A	8 (TBR)	23.0
5	GOES EAST	Mesoscale (Flexible 1000 x 1000 km)	Lambert Conformal	0.5	1	0.47, 0.865, 1.61	N/A	8 (TBR)	23.0
6	GOES EAST	Mesoscale (Flexible 1000 x 1000 km)	Lambert Conformal	0.5	2	1.378, 2.25, 3.90, 6.19, 6.95 7.34, 8.5, 9.61, 10.35, 11.2, 12.3, 13.3	N/A	8 (TBR)	23.0
7	GOES EAST	Full Disk	Mercator	15	0.5	0.64	Lower Left: 75S 145W Lower Right: 75S 5W Upper Right: 75N 5W Upper Left: 75N 145W	8 (TBR)	50.0
8	GOES EAST	Full Disk	Mercator	15	1	0.47, 0.865, 1.61	Lower Left: 75S 145W Lower Right: 75S 5W Upper Right: 75N 5W Upper Left: 75N 145W	8 (TBR)	50.0
9	GOES EAST	Full Disk	Mercator	15	2	1.378, 2.25, 3.90, 6.19, 6.95 7.34, 8.5, 9.61, 10.35, 11.2, 12.3, 13.3	Lower Left: 75S 145W Lower Right: 75S 5W Upper Right: 75N 5W Upper Left: 75N 145W	8 (TBR)	50.0

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.



Appendix E: AWIPS Sectorized Product Set Characteristics									
Sectorized Product ID	Satellite Orbital Slot	Sector	Map Projection	Refresh (Full Disk: Mode 3: 15 Min Mode 4: 5 Min) (minutes)	Resolution (km)	ABI Bands Used (central wavelength, micrometer)	Corner Points For Full Disk- Based on +/- E/W 70 degrees from station longitude For Alaska Region - Current Reference longitude at 150W	Bit Depth	Latency (s)
10	GOES WEST	West CONUS	Lambert Conformal	5	0.5	0.64	See ABI Performance and Operational Requirements Document, 417-ABIPORD-0017	8 (TBR)	50.0
11	GOES WEST	West CONUS	Lambert Conformal	5	1	0.47, 0.865, 1.61	See ABI Performance and Operational Requirements Document, 417-ABIPORD-0017	8 (TBR)	50.0
12	GOES WEST	West CONUS	Lambert Conformal	5	2	1.378, 2.25, 3.90, 6.19, 6.95 7.34, 8.5, 9.61, 10.35, 11.2, 12.3, 13.3	See ABI Performance and Operational Requirements Document, 417-ABIPORD-0017	8 (TBR)	50.0
13	GOES WEST	Mesoscale (Flexible 1000 x 1000 km)	Lambert Conformal	0.5	0.5	0.64	N/A	8 (TBR)	23.0
14	GOES WEST	Mesoscale (Flexible 1000 x 1000 km)	Lambert Conformal	0.5	1	0.47, 0.865, 1.61	N/A	8 (TBR)	23.0
15	GOES WEST	Mesoscale (Flexible 1000 x 1000 km)	Lambert Conformal	0.5	2	1.378, 2.25, 3.90, 6.19, 6.95 7.34, 8.5, 9.61, 10.35, 11.2, 12.3, 13.3	N/A	8 (TBR)	23.0
16	GOES WEST	Alaska Region (N&W of CONUS)	Polar Stereographic	15	0.5	0.64	See ABI Performance and Operational Requirements Document, 417-ABIPORD-0017	8 (TBR)	50.0
17	GOES WEST	Alaska Region (N&W of CONUS)	Polar Stereographic	15	1	0.47, 0.865, 1.61	See ABI Performance and Operational Requirements Document, 417-ABIPORD-0017	8 (TBR)	50.0
18	GOES WEST	Alaska Region (N&W of CONUS)	Polar Stereographic	15	2	1.378, 2.25, 3.90, 6.19, 6.95 7.34, 8.5, 9.61, 10.35, 11.2, 12.3, 13.3	See ABI Performance and Operational Requirements Document, 417-ABIPORD-0017	8 (TBR)	50.0
19	GOES WEST	Full Disk	Mercator	15	0.5	0.64	Lower Left: 75S 153E Lower Right: 75S 57W Upper Right: 75N 57W Upper Left: 75N 153E	8 (TBR)	50.0

Appendix E: AWIPS Sectorized Product Set Characteristics									
Sectorized Product ID	Satellite Orbital Slot	Sector	Map Projection	Refresh (Full Disk: Mode 3: 15 Min Mode 4: 5 Min) (minutes)	Resolution (km)	ABI Bands Used (central wavelength, micrometer)	Corner Points For Full Disk- Based on +/- E/W 70 degrees from station longitude For Alaska Region - Current Reference longitude at 150W	Bit Depth	Latency (s)
20	GOES WEST	Full Disk	Mercator	15	1	0.47, 0.865, 1.61	Lower Left: 75S 153E Lower Right: 75S 57W Upper Right: 75N 57W Upper Left: 75N 153E	8 (TBR)	50.0
21	GOES WEST	Full Disk	Mercator	15	2	1.378, 2.25, 3.90, 6.19, 6.95 7.34, 8.5, 9.61, 10.35, 11.2, 12.3, 13.3	Lower Left: 75S 153E Lower Right: 75S 57W Upper Right: 75N 57W Upper Left: 75N 153E	8 (TBR)	50.0

Note: Sectorized Product Latencies are contained within the same Vendor-Allocated Ground Latency as Appendix A and D Cloud and Moisture Imagery latency.